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# FOSTERING SELF-DIRECTIVE ABILITY IN PUPILS

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AMONG the abilities possessed by man, none plays a more prominent part in enabling him to forge to the front than the ability to meet new situations successfully—in other words, to get along without direct assistance. Question any successful executive regarding the secret of his success and if he has ever taken the time to jot down the probable causes it is safe to say that this rare ability above referred to will not only be on the list but will be given first place. In truth, ninety-nine out of one hundred successful men would unhesitatingly subscribe to the dictum that "it is not so much the extent of an employee's knowledge as it is his ability to apply what he has learned that measures the value of his training." Independence rather than dependence is what commands the attention of those searching for exceptional assistance; while resourcefulness of the right kind may ask almost any price for services rendered. Note what Chas. H. Sabin of the Guaranty Trust Company has to say on this point. "Every employer is looking for the man who not only *can* think but *will* think. One can hire any number of people marvelously skilled in routine or in detail, human machines that will run on splendidly as long as motive power is supplied and nothing unusual turns up in the work. The rare man is the one who can think; who can, so to speak, see beyond his nose and understand that a fact is of no particular importance merely as a fact, but that it derives its importance from its relations; and who will see what these relations are."

### Universal Weakness of Our Schools.

Even casual observers of our secondary schools must have noticed the universal tendency to attach great importance to the acquisition of facts and relatively little importance to the ability to use such facts intelligently. This is far from saying, however, that it is unnecessary for pupils to acquire significant facts. Who knows but that the old colored lady may have been referring to this necessity for facts rather than to thinking equipment when in response to her husband's statement that he was thinking she curtly inquired, "What wid"? Certainly, facts whether in the form of information gained from books, from daily mingling with one's fellow men, or from participation in occupations of one or another sort are important, yes indispensable, but the possession of facts alone never enables one to attain positions of greatest prominence nor to be of maximum service to society. To borrow Dr. Dewey's terms, one must learn "to think with" rather than merely "to think about" the information possessed.

### Lack of Progress Explained.

In the belief that thru an enumeration of the probable causes of this nonprogressiveness among school officials some light may be thrown upon the subject as a whole, the following brief explanation is offered. In the first place, fact subject-matter is much more easily organized than thought subject-matter. In the second place, partly because of the greater ease with which it may be organized, fact material is more easily taught than thought material, granted that one may be permitted to say that subject-matter of any kind is taught. And in the third place, testing in the fact field is relatively simple, administratively speaking, when compared with testing in the thought field. To illustrate: with what relative ease one may conduct a quiz or a test by means of who, what, or when questions as contrasted with what he must do if he uses why or how questions. The writer recalls distinctly an experience thru which the Board of Examiners in a highly centralized state system recently passed when it attempted to give history examinations which consisted in part of thought questions; and how, after being almost overwhelmed with complaints, it decided to abandon the position taken and return once more to the use of pure fact questions. The fourth and final reason suggested for lack of progressiveness along the lines indicated is the natural apathy of mankind. Margaret Slattery was not far wrong when she said that two goals well worthy of any person's ambitions are: to make women think, and to make men feel uncomfortable. For some reason, probably it is instinctive, man is unkindly disposed toward anything that is likely to demand much change in his methods of living. In fact, so pronounced is this dislike that, barring an appeal to personal pride, scarcely anything ever seriously disturbs him.

### Suggested Program of Action.

A diagnosis of the situation reveals three types of pupils which must be dealt with in seeking to foster the development of self-directive ability. Either

1. they do not see the problem clearly,
2. they are indisposed, indifferent, indolent, or over-timid, or
3. they lack ability to solve their problems, assuming of course that they are properly disposed.

The remainder of the article will consist of suggestions regarding how to prescribe for each of the above types to the end that disposition and ability to proceed unassisted may be fostered in the pupils.

**I. When pupils do not see the problem clearly, i. e., do not understand what they are supposed to do.**

The teacher's task, when such conditions prevail, is that of adapting more successfully the subject-matter to the pupil, or if that cannot be done, of discarding it entirely. How this adaptation is to be accomplished depends upon two things—the pupil concerned, and the subject-matter. Thus, a method that might be suitable for one pupil or for one type of subject-matter might be quite unsuitable when conditions are changed. Manifestly the chief causes of a pupil's inability to comprehend problems are careless reading or observation, lack of necessary information, and indefinite or inaccurate assignments or directions.

Where the first cause prevails a careful re-reading of the specifications (directions, descriptions, etc.) with the pupil, or if necessary to him, will often result in clearing up obscurities. Frequently the injection of a well-chosen question into the situation will serve the same purpose. If lack of information is responsible, then it devolves upon the teacher to meet the pupil's needs in another manner, namely, thru referring him to suitable printed matter, to classmates or other qualified persons, or to places where better opportunities to observe prevail. As a last resort, if the case justifies, the teacher himself may furnish it directly.

The relative number of cases where inadequate comprehension on the pupil's part is responsible for his lack of progress is doubtless much larger than is generally believed. For this, both our unpsychologically constructed texts and our unsound teaching of thought matter are chiefly responsible. We have thoughtlessly built many of the problems which we give to our pupils around or from material which is more or less foreign to them. Why should they understand them? Doesn't it stand to reason that if we are to expect good results we must see to it that the problems given to our pupils, regardless of their nature or form, are so expressed that the pupils may readily understand them. (See Recent Developments in Educational Measurements by Dr. E. L. Thorndike, Report of the Fifth Conference on Educational Measurements, Indiana University).

**Use of Texts Recommended for Shop Classes.**

The large majority of industrial teachers are making too little use of printed material in their classes. Even now it is the exception rather than the rule for such teachers to refer their pupils to printed information. Nor have they attempted, except in rare instances, to supply the necessary information in other than a verbal form. What justification for such action have industrial teachers when their pupils literally wear out copies of Popular Mechanics and similar magazines in their eagerness to secure information? Would it not directly foster the development of self-directive ability if teachers would prepare for their pupils suitable questions on various phases of their respective fields? What possible excuse can a vocational teacher offer for being unacquainted with the best books and current articles in his field and for not arranging conditions so that his pupils have easy access to them? Until quite recently, to be sure, trade teachers had reason enough for not referring their pupils to sources of printed information. But with the market stocked as it now is with the products of book companies and advertising departments of industrial plants, valid excuses may not longer be offered.

The blame for such neglect, however, cannot be laid entirely at the door of the teachers in this field for in many instances their superintendents and supervisors have turned a deaf ear to their requests for suitable reading matter. Many times has the writer been informed of the refusal of administrative officials to recommend the purchase of texts for pupils in shop subjects, their reason for such refusal being that texts have not been used heretofore and that, therefore, they are not necessary now. The weakness of such an explanation is too obvious to justify comment. How can any thoroly trained school official possibly assume for one minute that without written material of some character the informational needs of the different types of pupils in shop classes will be met? Surely such officials must know that not all teachers are so constituted that they can and do organize and present subject-matter in a logical and comprehensive manner; and that pupils who do not readily retain spoken information should have access to the same information in written form.

**II. Where pupils are indisposed, indifferent, indolent or over-timid rather than unable to comprehend.**

When these conditions prevail teachers face problems decidedly different from those just considered. Where indisposition or indifference is characteristic of pupils the only wise course is to choose subject-matter which is more intimately related to the lives of the pupils, or to arrange it so that it is better adjusted to them. The normal pupil, i. e., the pupil who enjoys good health because he eats and sleeps as he should, is in ninety-nine cases out of a hundred, not indisposed or indifferent to an environment that seems worth-while to him. On the other hand, it is very possible for pupils to become discouraged or disheartened because the subject-matter which they are really interested in and have earnestly tried to master seems altogether too hard. Finally, teachers make the mistake of keeping pupils, or at least trying to keep them, at work on operations which they (the pupils) know they already do fairly well—in fact, often quite well enough. This is particularly true with penmanship, oral reading, and the fundamental opera-

tions in arithmetic in our schools. It is more than sheer waste of time to keep pupils doing things which they already do sufficiently well since such practice directly promotes the development of an attitude of increasing indifference or divided attention toward their various tasks. The writer feels sure that he is not the only one who must admit that more than once during his teaching experience he was guilty of this charge. As a matter of fact the utter uselessness and hopelessness of the deplorable methods employed did not appear to him until he had taught (?) for several years. And then as now, ignorance, unresourcefulness, and laziness were the besetting sins of teachers. If some of the present teachers knew better they would do better; if others who know better were not so lacking in resourcefulness they would discard such poor methods; and if still others who possess both knowledge and resourcefulness were not lacking energy they would reform. It remains for such to realize that personal example is and always will be the greatest teacher and that it functions in every known social situation.

Where pupils are too timid for their own good the teacher's problem is again different. Here it is the teacher's business first, to endeavor by every available means to encourage them to assume responsibilities and second, to provide assistance of such character that increasing confidence in their abilities is gained by the pupils. It goes without saying that the teacher will be careful to assign tasks that are possible of accomplishment. Here, perhaps more than elsewhere, much depends upon the teacher's personality, his ordinary tone of voice, his customary method of address, his attitude toward incidents in classroom, etc. For just as with the average adult, so with the average youth, if he thinks he is "whipped" he is well along the road to that state. Self-confidence, just as any other attribute or ability, develops because of having regular and appropriate nourishment. Timidity is largely synonymous with lack of confidence and will slowly but surely disappear in proportion as effort expended brings success. The wise teacher will be unusually careful to praise acceptable work from timid pupils and will also be equally careful to refrain from criticising harshly any poor work done by them.

**III. When pupils lack ability to solve problems assuming, of course, that they understand them and are properly disposed.**

Inability to solve problems may be due to any one or to a combination of the following:

1. Lack of necessary information.
2. Lack of manipulative ability.
3. Inability (not incapacity) to do the required reasoning.

Case No. 1 has already been covered. Where manipulative ability is lacking, as is frequently true in shop classes, assistance may appropriately be given in one or both of the following ways: first, actually perform a part of the work for the pupil after which he is called upon to finish it; or second, demonstrate how the task should be done by means of other material than that being used by the pupil, then leave it to him to follow instructions. A pertinent question to raise here is whether the teacher should ever assist the pupil by actually doing a part of the task *for* him rather than *before* him. Wherever conditions do not utterly forbid, the latter method should be practiced. But if the pupil is facing a very difficult part of the work, one that in the teacher's judgment is probably or really too hard for him, let the former method be employed without fail. A discouraged pupil never progresses far under favorable conditions, not to mention unfavorable ones. And since the all-important thing is to keep him encouraged, i. e. believing in himself, or in other words, keep him progressing or at least believing that he is progressing, then do the thing necessary to accomplish this. It is assumed, to be sure, in the foregoing statement that the task as a whole is within the possibilities of accomplishment by the pupil. When such is true it is nothing short of folly to assert, as is frequently done, that teachers should never actually perform a part of the task for the pupil. It may be safely asserted, however, that if the task is properly adapted to the pupil's ability there will be little if any necessity for assistance of the character mentioned.

Not infrequently inability to perform the necessary operations is due to ignorance regarding materials, tools, equipment, etc., and the respective uses to which each may and should be put. Again it may be due to ignorance regarding how to care for tools and equipment properly. Few careful observers have not seen instances where the poor condition of tools was primarily responsible for the poor quality of work done by an artisan. It is the duty of shop teachers to diagnose each case previous to prescribing. The weaknesses of budding artisans are by no means uniform despite the fact that the methods employed by many teachers lead us so to believe. The parts played respectively by good sharp tools and wisely chosen pieces of material in the construction of articles cannot be learned in a few minutes. Here, as elsewhere, the fundamental laws of teaching must conform to the inviolable laws of learning. "Fool proof" devices may be used advantageously in our factories and shops, and fortunately so, but when it comes to handling human material such devices, unfortunately, cannot be utilized to the same advantage. The successful teacher must of necessity first possess ability to note all the case symptoms. For here as well as in the physician's field safety lies only in prescribing in terms of ascertained needs. As matters now stand no greater contribution could possibly be made to education than that of indicating how to train teachers so that they uniformly possess this rare ability to diagnose accurately. Educational procedure must continue to remain unscientic with the large majority of teachers until the contribution above indicated is forthcoming. Speaking in

terms of medical development, relatively few teachers have ever passed beyond the "home remedy" stage, not to mention the large number who, judging from results, are still living in the age when quacks and superstition reigned.

**Use of Instruction Sheets Advised.**

In times past considerable controversy has centered about the use of instruction or job lesson sheets in shop work. Opponents of the plan have vigorously contended that if the method of procedure is fully indicated to a pupil who is, for example, constructing a taboret or turning a taper the necessity for thought on his part is therefore removed and stultification necessarily promoted. They claim, and rightly so, that the essence of every situation is its problematical character and that when this is tampered with to the extent that it is essentially eliminated the real educational worth of the situation is lost. So far so good. Even the most radical will go with them to this point. The parting of the ways comes for many, however, when interpreting and applying these fundamental principles. The essence of each life situation is most assuredly the problem or problems involved therein. But when one seeks to make a practical application of this principle to shop class conditions some very complicating matters arise for consideration, matters which to a considerable degree are peculiar to classes in purely manual work. These may be advantageously set forth by means of the following questions:

1. Should the teacher of shop classes assign the same task to all pupils?

2. In case certain pupils make relatively rapid progress what is the teacher to do with them while waiting for the slower ones to complete the assigned task?

3. In case, as is often true, the number of directions in a demonstration numbers fifteen or more, which of the following methods should the teacher pursue:

   (a) Give the entire demonstration with full consciousness of the likelihood or even the necessity of later having to repeat part or all of it?

   (b) Give only part of the demonstration at one time continuing it, (1) when the most advanced pupils are in need of more, or (2), when all are prepared for more?

   (c) Give the entire demonstration and then give instruction sheets to each pupil?

   (d) Make a few remarks regarding the class project (in many cases the time requirements for a demonstration are prohibitive), place instruction sheets in the hands of the pupils, and give assistance thereafter to individual pupils when necessary?

4. How should the teacher in shop work manage in order that an attitude of industry rather than one of "marking time" shall increasingly characterize the pupils?

These and many other pertinent questions must be answered by the practical shop teacher. Of little avail is it to him to sit in his office, if he has one, and spin out engaging theories regarding the undesirability of doing and thinking for his pupils or to sit in the classes of professors of education who take pleasure in spinning half-fledged ideas on such matters. His task is that of meeting the emergencies of a shop class in such a way that his pupils shall acquire technique of procedure, a certain amount of skill, knowledge of tools and equipment and their various uses, habits of initiative, industry and self-confidence as well as ability to meet new situations successfully. As a consequence he cannot afford to divorce theory from practice nor in fact even countenance theoretical discussions that are not unmistakably related to practice at every stage of the game. The value of the instruction sheet which indicates proper and complete sequence of procedure in detailed form to pupils can scarcely be overestimated, especially during the period when the pupils are gaining knowledge about and acquiring familiarity with tools and equipment. It is not necessary to state that following this stage of the pupil's career a method necessitating increasing dependence upon self should be employed. On the other hand, it should be made emphatic that the failure to use such effective means of assistance as is provided in instruction sheets during the early period of shop experience is directly conducive to the acquisition of the pernicious habit of "fooling around" and waiting for the bell to ring, a habit that seems to carry over very readily into other walks of life. Ability to proceed in a straightforward unhesitating manner at one's task is an indispensable part of what goes to make up a first class workman. If any defense for "instruction sheets" or as they are sometimes known "job lesson forms" were necessary one need not search for further evidence than their contribution to the promotion of desirable habits in young workmen.

**Instruction Sheet—Relining Bands—Auto Repair Shop.**

1. Carefully remove old lining.
2. True up metal band.
3. Place on new lining and clamp fast.
4. Place block of wood in the vise with end of grain up and shaped to conform to inside of band.
5. Hook band over block.
6. Drive rivets thru lining into wood. Use long and short rivets as required. (It will be necessary to use a punch on some of the rivets to drive to seat).
7. Spread rivets. Have rivet head resting securely on metal. With a ball pein hammer drive ends of rivet a little below surface of lining. (Unless extremely careful band will be driven out of true and more time will be required to straighten than the entire job should have taken).

Approved assistance of still another character consists in providing pupils with models or pictures of models of the article to be constructed. Sample joints, for example, which reveal the essential points in construction and thus provide excellent assistance to pupils are highly desirable. Especially is this true where the pupil has difficulty in carrying in his mind the image of the object he is producing. Teachers all too commonly forget how their progress was impeded in early life by reason of indistinct images of what they were

trying to produce. They somehow fail to remember the frequency of their visits to sources of information, the model, when this was possible, with all it meant in the way of helpfulness. *Every classroom should have a show case containing models of all of the important shop jobs.* Their teaching value is quite inestimable if properly utilized.

A near relative both to this and to the instruction sheet method is that commonly referred to as the "evolution" method, that is, where the shape of the article or parts of it at all important stages of its development are shown either in actuality or in a detailed photograph. The advantages of this method are apparent since it comes as nearly providing a constant model as any method can. One might say that by means of it more or less complicated objects are rendered relatively simple, or in other words, that the pupil has the successive goals specifically set before him. These goals afford an excellent opportunity for assuring himself whether he is pursuing correct lines of procedure not to mention the great contribution in the way of reducing opportunities for "dilly-dallying" and providing encouragement at proper times. As to objections to its continuous use with the same pupils, they are answerable in the same words as were those considered in connection with instruction sheets. Needless to say the "evolution" or "step indicating" method is not practicable except within the field of relatively simple objects, tho it may be made to do excellent service in all of the ordinary trades.

The author is convinced also that teachers of manual work would contribute much toward the development of self-confidence in their pupils if they would go to the trouble to prepare copies of important working directions or rules, "tricks of the trade", and either post them conspicuously or place them in the hands of their pupils. Unquestionably, these may be used to great advantage in saving time, in preventing accidents, in reducing expenses, etc. To illustrate:

**Specific Directions for Vulcanizing Shop.**[1]

1. Before cutting rubber, dip knife in water.
2. Do not try to work with a dull knife.
3. Be sure that fabric in a tire is dry before trying to repair it.
4. When air bags are not in use keep inflated. This prevents buckling.
5. Keep molds and tube plate bright and clean. Polish with steel wool or emery paper. Apply coat of soap and water solution with brush.
6. Molds must be properly heated before work is placed in them.
7. Avoid pulling stem when removing air bag from case.
8. Do not sharply bend or crease air bag.
9. After repairing inner tube, test it under water to make sure there is not another leak.
10. Always remove pressure from air bag before loosening clamps on mold.

A less frequently employed method of aiding pupils is that of furnishing articles of some sort which merely embody the principle involved in the object or article being constructed. To illustrate: one of the difficult things to teach in patternmaking is how to make proper allowance for both inside and outside finish. The problem is perplexing at best, but to many pupils it presents almost insuperable difficulties. The tendency is to make both allowances in the same direction rather than in opposite directions. To overcome such a tendency some sort of "crutch" might be temporarily provided, something in concrete form upon which the boy's mind may be momentarily concentrated as he figures on his specific problem. Only in this way will he be enabled within a reasonably short time to reason correctly in such situations. Some teachers have found a piece of ordinary gas pipe exceedingly helpful in this connection since it furnishes, in a general way, material in the same form as the article to be turned out from the pattern being constructed. Thru this and similar means is the troubled pupil encouraged and enabled to ask and answer the important questions: What allowances would I have to make if I were constructing the pattern for this piece of gas pipe? Should these allowances be made in the same direction or in opposite directions?

There still remains for consideration the task of teaching pupils to think their way thru problems when the problems are not of such nature as to make advisable or convenient the use of the various means above suggested. This is the ability so highly prized in business life, since it enables one to analyze unusual situations, in fact, to penetrate to the very heart of matters. Yet unfortunately it is more often absent than present.

Dr. Judd in speaking of this important matter says: "There are two types of practical workmen in every trade. The one type has acquired practical skill and has never thought about the way in which that skill was acquired, nor why he is skillful. He works in a routine fashion, his actions becoming more and more solidified in the direction in which he started by accident at the beginning of his training. His methods become more and more fixed and his whole attitude of mind comes to be that of an unquestioning worker relying absolutely upon the habits and controls he has always used. The other type is always looking for possible improvement in method and succeeds in introducing innovations in his modes of activity which are economical or at least may be tested as to their economy. He looks upon every situation as an object of interest and an opportunity for study."

In order that teachers may turn out a product possessing the enviable talents of the second type the program of action must be clear and direct. Their time at best is short and fleeting and affords no room for uncertainty either as to material or method. Learning to think logically is a huge task in itself but even so it is small when compared with the task of teaching others to think in that way. The program is three-fold in nature:

1. They must practice sound thinking in the presence of their pupils.

[1]Courtesy of Raymond Kuns, Principal of Automotive School, Cincinnati, O.

2. They must analyze situations where thought is involved so that the component parts of the thought act will become visible. As the author said in the October issue of this magazine, "The laws of teaching which apply to demonstrations in the purely manual field apply equally and similarly in the purely mental field." If there is a proper sequence of operations in straight manual work, then there is a proper sequence in straight mental work. For all worth-while thought is orderly rather than disorderly in procedure. How important it is not only that teachers appreciate the necessity of thinking clearly before their pupils, which in and of itself is of vital importance, but that they endeavor to reveal in all its completeness the meaning of logical continuity of thought. If this requires more than mere logical thinking before pupils then let the next step be taken, namely—

3. Break the thought unit into smaller parts, thus increasing the likelihood of comprehension on their part Finally, if complete success has not yet resulted, it devolves upon teachers to ask questions in such a way that when they are answered the successive component parts in the thought unit will have been brought to the pupils' attention. The one remaining variation of the foregoing program is to demonstrate, that is, think aloud in the pupils' presence.

A practical illustration of how to ask questions so as to foster careful analysis of the entire problem and to aid to a definite decision regarding the necessary steps to be taken in solving it is found below. Let the reader bear in mind that the questions are intended to accomplish two things, both of which are essential to good workmen, namely, cause the pupil to recall and utilize the necessary trade knowledge, and bring to light the fundamental constructive principles involved.

*Printer's Copy*

University of Cincinnati.....19....

Dear Sir:

This will serve to introduce ..... one of the students in the course for training trade and industrial teachers at the University. He is desirous of learning as much as possible regarding methods of teaching and class management and will, therefore, appreciate every courtesy in the way of information or advice you will be generous enough to extend him. As director of this work I express the confident hope that utmost cooperation may be realized.

*D. J. MacDonald,*
*Professor of Vocational Education.*

*Explanatory note for pupils*: The above copy is to be placed upon a card which is to be used for introducing students in my courses to the principals of schools visited and to teachers of the classes observed. Each student will have but one card which he must carry for several weeks and present to several different persons.

**Suggested Questions for Teachers.**

1. What facts must you bear in mind when selecting stock for this job? (The object of this question is to lead the pupils to think of the intimate relation which always should prevail between the stock selected and the purpose for which it is intended. The discussion should result in a consideration of what is the proper weight, finish, and color of stock for the job).

2. What stock do you think suitable for the work? Why do you think so? (The intent here is to cause the pupil to state the result of his deliberations in brief form).

3. How are you going to find out the size to which you should cut your stock? (The intent here is to lead the pupil to think of the relation between (a) the amount of printed matter and the size of card; (b) the size of card and the stock from which it is to be cut; (c) the size of card and the use to which it will be put.)

Obviously, the pupil will be called upon to make a rough layout of the job before he can determine what size of card will be advisable. Making the layout will, of course, involve a choice of suitable type, thus anticipating the next question).

4. What kind of type do you think will be best for this job? (The object here is to bring to the attention of the pupil the necessity of (a) having type that accords with the nature of the message; (b) having type that is easily read).

5. What color of ink should you use? Why? (The purpose of this question is to bring out the close relation that exists between (a) the color and quality of ink and the nature of the message; (b) the color of ink and the color of the paper).

While a definite program has been set forth in the foregoing paragraphs, one that has been tested repeatedly even to its minutest detail, this article would be quite incomplete unless attention were called to the necessity not only of adequate knowledge on the teacher's part of the principles of psychology but as well of the many and varied phases of the art of teaching. Without such the teacher who attempts to take advantage of these or any other suggestions will sooner or later declare them of doubtful value. And lest there be some with little or poor professional preparation who will try to put them into practice the following cautions are offered:

Endeavor to put into operation only a few new ideas at one and the same time. It is unfortunate but true that relatively few teachers are consistent in observing the fundamental principles of habit formation, one of which has just been mentioned. Over and over they will introduce new methods of procedure with proper eclat only to permit frequent and continual exception to them. Again they will unwittingly institute various new lines of activity simultaneously, some of which are at points directly antagonistic to others.

Or finally, they will try to have pupils correct or modify several well established habits at one and the same time. Of course the result is unsatisfactory to all concerned. How could it be otherwise when all of the principles of habit formation are grossly violated?

When all is said and done, whether or not the suggestions contained in this article ever become flesh and blood in the hands of shop teachers will depend first of all upon the intrinsic worth of such suggestions and second, upon the wisdom displayed by those who attempt to utilize them.

A Group of Embroideries and Some of the Original Sources from which the Designs were drawn.

# TEXTILE DESIGN—AN ART FOR AMERICANS

Jean Paul Slusser, New York City

THAT America has during the last few years practically won her independence of Europe in textile design, and the arts of fashion and of dress, has for some time been a commonplace with those in a position to know. It needed, however, an event like the epoch-making exhibition of Industrial Art in Textiles and Costumes, held during November at the American Museum of Natural History in New York, to demonstrate the matter convincingly to the general public. And not one of the tens of thousands of people who saw this impressive display of American-made and American-designed fabrics and styles went away without realizing not only that American design in this field had arrived, but that it had arrived thru certain very interesting and rather surprising channels. Some hint of what those ways were, of what were the points of beginning and of inspiration for the newly sprung group of young designers who appeared in this country several years ago in response to the demand of the emergency created by the Great War, may be of value to a wider public than was able to see this unique exhibition.

And here be it said that not the least important feature of this exhibition was the fact that it was held in a museum of natural history. No better example than this could be given of the enlarged conception which our American museums are coming to take of their function with regard to the public good. Here was a museum which conceived its mission to lie not alone in preserving, and displaying for the benefit of the curious, the relics of the past, but in actively concerning itself with the life of the present and of the future. Here was a museum which for years past had pushed its propaganda until its ideas have permeated Broadway and Fifth Avenue and ultimately will be felt thruout the entire land. Here was a museum willing to discard convention, and exhibit beside its skins and stones and relics of the past, the machine-made product of the moment from the city outside its doors. Still more—shades of William Morris!—here were the machines themselves. Beside the looms of a thousand years before yesterday dug up from the grave of the past, resounded the clatter and crash of the most modern and complex of Jacquard looms straight from the mills, weaving the ribbons and silks that would be worn tomorrow on the Avenue and thruout the country.

It is the triumph of the American Museum of Natural History that, with the aid and cooperation of the manufacturers, it has shown us what American textiles are coming to mean, but far more than that it has itself for the past several years put forth the efforts which more than any other one thing have made those textiles what they are. What it has done other museums can do, in this and other branches of industrial art. It has made its collections particularly available for the use of craftsmen and designers, and the craftsmen and designers have gone straight to its collections and found there the inspiration they have needed for their work. In the arts and crafts of the Indians, Aztecs, Peruvians and other earlier inhabitants of this continent our designers—young people mostly, and in most cases bound by no conventional tradition—have gathered design motifs for

the silks, embroideries and cottons that are coming to be known as distinctively American.

In France designers have long known how to make good use of the museums for obtaining ideas, color-schemes, motifs for decoration. But it has been only recently that American designers have realized that here in their museums and in the examples of native art scattered thruout the length and breadth of the land, in Indian blankets and beadwork, in Colonial hand-woven spreads and even in the fine old patchwork quilts of our grandmothers, we have the materials for an art peculiarly and richly our own. No longer do our designers need to imitate French designs in dressgoods and sell them to manufacturers who label the product "imported", and no longer do imported goods and designs of whatever sort take precedence over our own. In fact the new American goods with their designs, the like of which have not before been seen, are creating a strong demand for themselves in the markets of the world. Perhaps it was under their influence that a prominent French designer not long ago placed an order in this country for a complete collection of Indian products, beadwork, textiles, furs, bows and arrows. Is it not high time that our children were taught to think in terms of native American, as well as of Greek, Roman, Egyptian or Renaissance, design?

The remarkable suitability of many of the ancient or primitive designs of our own and other continents for modern uses is shown by some of the accompanying photographs, all of them of actual textiles or garments actually produced for commercial purposes. In some cases the ancient pattern has been followed almost line for line, but in the cases of silk and cotton design, not here illustrated, the designer created his pattern far more completely himself, with perhaps a mere hint or a suggestion from the original source.

Thus with continual reference to the examples of applied art of other ages and regions, and always to nature herself, our young designers have progressed during the last five years. Under the stimulus of frequent contests and exhibitions held under the direction of Mr. M. D. C. Crawford, research associate in textiles at the American Museum of Natural History, and design editor of "Women's Wear", thru the good offices of this trade paper and the Art Alliance of America, the designers have produced each year work of greater richness and variety. The manufacturers, for their part have cooperated since the beginning with interest, practical advice and substantial prizes. They too have undergone a process of education in favor of freer and more artistic ideas, the more far-seeing and more adventurous manufacturers naturally making the most pro-

Siberian Fur Garment in the Collection of the American Museum of Natural History.

Ladies' Cloak Following the Lines of the Siberian Fur Garment in Adjoining Illustration.

A Seventeenth-Century Japanese Laborer's Coat. Made of Leather.

A Lady's Cloak Based upon the Design of the Japanese Coat.

gress. They have had faith in ideas, and their faith has brought them success. As a result of all this it is a fact that some of the most advanced ideas current in the world of art today are being tried out by the textile designers of this country, and are meeting with success in terms of dollars and cents.

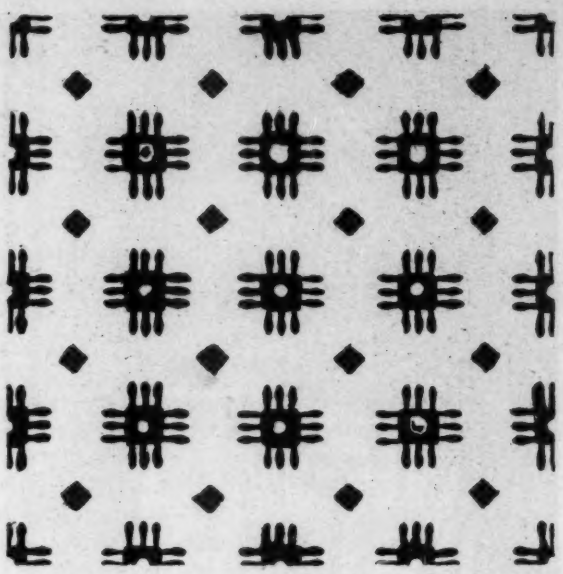
The moral of this exhibition and others like it is that while much has been accomplished, there is an ever increasing need for industrial education in this country, education thru schools, education thru museums, education thru any means whatsoever. For its part the American Museum of Natural History is cooperating with the State Board of Education of the State of New York and has standardized a large series of photographs covering the natural history of design, for use in teaching. Typical designs and fine specimens of applied art are brought together from all parts of the world. Lantern slides, models, and actual specimens are also made available for purposes of study and teaching in the public schools.

It is an encouraging fact that the number of schools to take an interest in textile design is constantly increasing. The arts of stenciling and wood-block printing as means of textile decoration have long been popular with a large number of teachers of art and manual training. Batik is just beginning to receive the attention it deserves as a means of teaching and studying textile design, tho few beyond a small group of artists and craftsmen have seriously done anything with it as yet, and the faddists, who have dabbled with it, have done little to increase its repute with the discriminating public. These hand processes are excellent as an approach to the field, and few are the designers of any importance who have not passed thru some or all of them as stages of progress and experience. But our age is, after all, first and last the age of the machine, and we shall achieve a successful industrial art of our own not by evading the situation, but by facing it, by learning to master the machine and forcing it to do our will, by studying its demands and capabilities and finally learning how to make it produce work as beautiful as handwork, in so far at least as may be.

So that it is an encouraging sign to find more and more an interest growing in the art of design for machine reproduction, in other words for cylinder printing. The increasing number of designs submitted from school children in our big Eastern textile contests and exhibitions are witness to the fact that public school art teachers are at last waking up to the artistic and practical value of this newest and heretofore most neglected and hence most dismally commercialized department of the industrial arts. One of the prizes awarded recently in a textile design contest held at the galleries of the Art Alliance of America in New York was given for

an admirable design by a child of 14 studying in a Cleveland public school. It was bought within 24 hours of the time it was first shown by a well-known manufacturer of draperies, and is now in process of reproduction. In its printed form it will be made up into an edition of thousands of yards, and will be sold broadcast from Maine to Mexico. It will hang in countless cottage windows, and give delight to countless people. It has become part of the great common heritage of art and beauty, and the person who created it, tho nameless to the world, is a public benefactor. It is a new thought to some of us that these designs all about us in daily life which we ordinarily take so much for granted, did not just happen, but were produced by people exactly like ourselves. As a matter of fact, the manufacturers are ever on the lookout for good designs, elaborate or simple, and pay real money for color sketches available for their purposes. American designs for dress silks and cottons, cretonnes and wall-papers were never in greater demand than they are at the present time, and there is no good reason why classes in design in secondary schools should not turn their attention toward the study of some of these practical forms of design in American industry, as indeed many classes under the leadership of able teachers are doing.

The principal obstacle to this study has of course always been the lack of familiarity of the student with the processes of reproduction and the ignorance of the mechanical demands to be met. Fortunately the requirements of cylinder printing are easily explained and understood. The design is printed from a repeat pattern engraved on copper cylinders, a separate cylinder being used for each color occurring in the design. It is thus essential in order to insure a perfect repeat of the pattern unit that the latter cover exactly the circumfer-



A Design for a Foulard. The original drawing measured 7½ inches square.

ence of the roller. When the edition from a design is complete the rollers are ground down to receive a new design, and hence their size is constantly diminishing—to a certain limit when they are discarded. Rollers for dress silks are 15 to 16 inches in circumference, so that the pattern to be mechanically correct must take up the entire 15 or 16 inches of the roller or must repeat an even number of times within 15 to 16 inches. The rollers for printing cottons are 16 to 18 inches in circumference, and the repeat therefore, must be figured on a basis of 16 to 18 inches. All designs must of course repeat accurately top and bottom and from side to side. The use of tracing paper for duplicating the parts of

A Textile Design for Foulard illustrating the Repeat. The unit as drawn out is 7½ inches square; two units fill the circumference of a fifteen inch roller.

A Silk Design. This design should have been worked out in four repeats to give a better idea of the finished textile.

A Group of Garments and the Museum Pieces which inspired the cut or decoration.

the pattern that approach the edges will be found indispensable. At least one full unit, and if the design is small, two or three repeats should be shown. Heavy bristol or illustration board are commonly used in preparing designs, tho many artists prefer to work on colored papers or mats of various sorts. Tempera paints are generally used because of the brilliance and solidity of the colors. A pattern is expensive for reproduction in proportion to the elaborateness of the engraving and the number of colors used. It is commercially important therefore, that the arrangement of colors be effective and the actual number of them be kept down. It is better to limit the number of colors to five or less, altho more are sometimes used. A large number of patterns are made for merely two colors, that is, white, or the color of the cloth, and one other color. The student should keep always in mind that a textile design is not a picture seen on a flat surface but the decoration of a material which will fall in folds. It is thus better to avoid realism and too great concern with natural forms as they actually are. In this again our earliest American designers, the Indians and Aztecs and Peruvians, have set us an admirable example and provided us with examples of industrial art which are a liberal education in design.

A Modern Embroidery and the California Basket from which the Design was taken.

# GRAPHIC AIDS IN ANALYSIS

Clyde A. Bowman, Director Department of Industrial Arts,
Stout Institute, Menomonie, Wis.

IN personal notes made by teachers in their individual survey studies of local industries, in either self-assignments in industrial analysis or class assignments in classes in organization of vocational or industrial work, graphic representation of the fields studied is helpful. This is especially true when the teacher is called upon to make selections for particular school groups. Constant revision is necessary to keep pace with industrial changes and a chart usually needs some adapting to fit local plants.

In work in vocational and industrial teaching now analysis means clearly focussed work of accurate content. To be oriented in the field in which you are analyzing and organizing is to see clearly the value of your specific work and at the same time appreciate and contribute to, and draw from, the other fellow's work. It is in this connection in the matter of scrutiny of the field of work in which your analysis is to be made, and from which selection for teaching is then taken, that these assignment charts are of assistance. The list of titles of the charts is tentative and is suggestive of typical studies which may be necessary. Acknowledgement for valuable assistance is made to:

Mr. Triggs, superintendent of plant of Harper and Bros., New York.

Mr. Riker, Construction Engineer, Stewart Co., New York.

Mr. Hanna, Building Superintendent, Frymier and Hanna, New York City.

Mr. Curtis, President Curtis Printing Co., Detroit, Mich.

Mr. R. L. Welsh, Instructor in Forging and Sheet Metal Work, Stout Institute, for assistance in preparing the Forging chart and to other instructors in Stout Institute Shops for checking and suggestions.

**Specialization in Trade and Industry.**

The Woodworking chart is a sample. The arrow lines show paths of travel under the usual conditions and suggest present trends in specialization. Each rectangle on this chart, as well as the others, calls for a detailed analysis of tools, machines, processes, materials, trade science, trade terms, etc. From this classified and related material certain parts are more significant for certain kinds of schools than others.

**Organization of Workmen and Jurisdictional Agreements.**

The Building Trades chart is a sample. Selections of trade and advancement lines, agreement groups, comman relationships between trades, and survey fields for installation of vocational work, are some of the study selections for certain kinds of schools.

**Specialization in Training Opportunities.**

The Metal Trades chart is a sample. The two suggested blocks of possible lines of travel fields on this chart are typical for proposals for completion of the assignments in the different types of metal work. The detailed chart of Forging is a sample of detailing preparatory to organizing courses in shop work in Forging and related study for certain groups.

**Occupational Experience and Probable Promotion Travel.**

The Printing chart is a sample. Assignments of this kind are for study selections for junior high schools. Part-time continuation classes have some aims in common with junior high schools in studies of occupational experience and possible advancement lines.

**Occupational Characteristics and Probable Promotion Travel.**

The chart of Drawing is a sample. Study here is of the different characteristics of a given kind of work, and their effect, as called for in different fields.

In the chart content there are several kinds of information of significance for various schools.

*In unit trade schools* information is of use on the sub-divisions in trends in the trades and in factory production, with suggestions for units for training.

*In general industrial schools* the location of the common ground in tools, machines, processes, and materials (the charts of trade groups) and lines of advancement travel is helpful.

*In part-time trade extension and evening industrial schools* there is suggestion in the lines of advancement travel and the suggestions for selection of sub-divisions for units of the size handled in schools of this type.

*In part-time trade preparatory schools* information aids in occupation selection and study.

*In junior high schools* there is aid in working out the basis for selecting representative work for courses required in such schools. Graphic aid is given for scrutinizing the total possibilities and selecting pertinent and representative shopwork in the light of the local and national conditions.

*In the senior high schools* there is significance as in the unit trade school plus use as a graphic core for certain phases of industrial history, economics, etc. There are suggestions for the study of the "why" and significance back of the lines of travel and specialization as indicated on the charts.

The four general fields in the Woodworking chart, Pattern Making, Carpentery, Cabinet Making, and Manufacturing are based on the common material, otherwise the presence of Pattern Making would need qualification. The devices used to indicate the nature of work in pattern making indicate a group of interlocking

*Note*—This paper and the accompanying charts were presented at the Conference of Manual Arts Instructors, Cincinnati, December 4, 1919.

processes. The pattern maker, while sometimes specialized, still must spend some time in allround experience. If the worker starts in pattern making his advancement will lead to foremanship, or in some cases, specialized foremanship. It often happens, however, that a man will lead to foremanship, or in some cases, specialized foremanship. It often happens, however, that a man will go from the pattern making field to others. Such change of occupation is not included in this chart. In planning courses in pattern making, because of the nature of the interlocking trade processes, a certain trade experience is necessary for all prospective journeymen pattern makers. Following this specialized units may be organized.

The detailing of the carpentry occupations is suggestive for the others. Entry is indicated in this work as being possible in three general directions. First, it is indicated into general carpentry related to house and general frame construction. This consists of a group of interlocking experiences in trade work, giving allround experience in carpentry. This interlocking group of processes, bears somewhat the same relation to carpentry as the general group of processes does to pattern making. Second, there is entry into the specialized fields which are subdivisions of the general allround carpentry trade. These sub-divisions or specializations, are, in the larger cities, sometimes called trades or occupations of themselves. Third, there is a line of entry into those special fields which, while having tools and materials in common with the other branches to a certain extent, at the same time require such specialized construction knowledge and skill as to make it best to put them by themselves.

Beyond the line indicating entry into the fields in carpentry are some lines of probable promotion or advancement travel. In the field of general carpentry three lines of probable advancement are indicated. First, there is entry immediately from broad experience in the work of a carpenter to the work of the building contractor. This is typical of small communities where the building contractor is a carpenter and sub-lets the bricklaying, stonework, etc. Second, there is line of travel into the interlocking fields of foreman, building superintendents, estimators, etc., in the larger communities where the work is still mainly carpentry. The third line of travel is into specialized sub-divisions of the work of a general carpenter and is typical of specialization in the trade in the larger cities where the building contractor is a carpenter and where carpentry is usually sub-let. From these specialized fields, possible, but not probable, travel is indicated into the interlocking fields of superintendent, estimator, etc. In the specialized work such as ship carpenter, car repairer, etc., travel is to foremanship positions or specialized foremanship positions.

Cabinet making as a trade, while declining, still has an interlocking group of experiences similar in relation to the trade of cabinet making, as have carpentry and pattern making. Travel from this experience in the trade is in three possible directions: First, to position as foreman or owner; second, to work as a cabinet maker in a factory; and third, into general entry into any subdivision of the machine processes of a factory. While travel is sometimes from the trade of cabinet maker to a position in a factory of the same name, i. e., cabinet maker, the nature of the work is limited. Fitting, assembling, and similar work, in quantity production, make up the duties of the cabinet maker in the factory. It is taking a part of the trade of cabinet maker and calling it by the name of the trade.

Four general divisions of the manufacturing cover the field, furniture manufacturing, the making of trim, and the two large divisions of special products. Stopping with the four-fold division is arbitrary and splitting up of the divisions would be carried on in detail if special study were made of a particular locality. There are two general lines of probable travel in the manufacturing, one thru the machine operating and the other thru the business operating and stock handling.

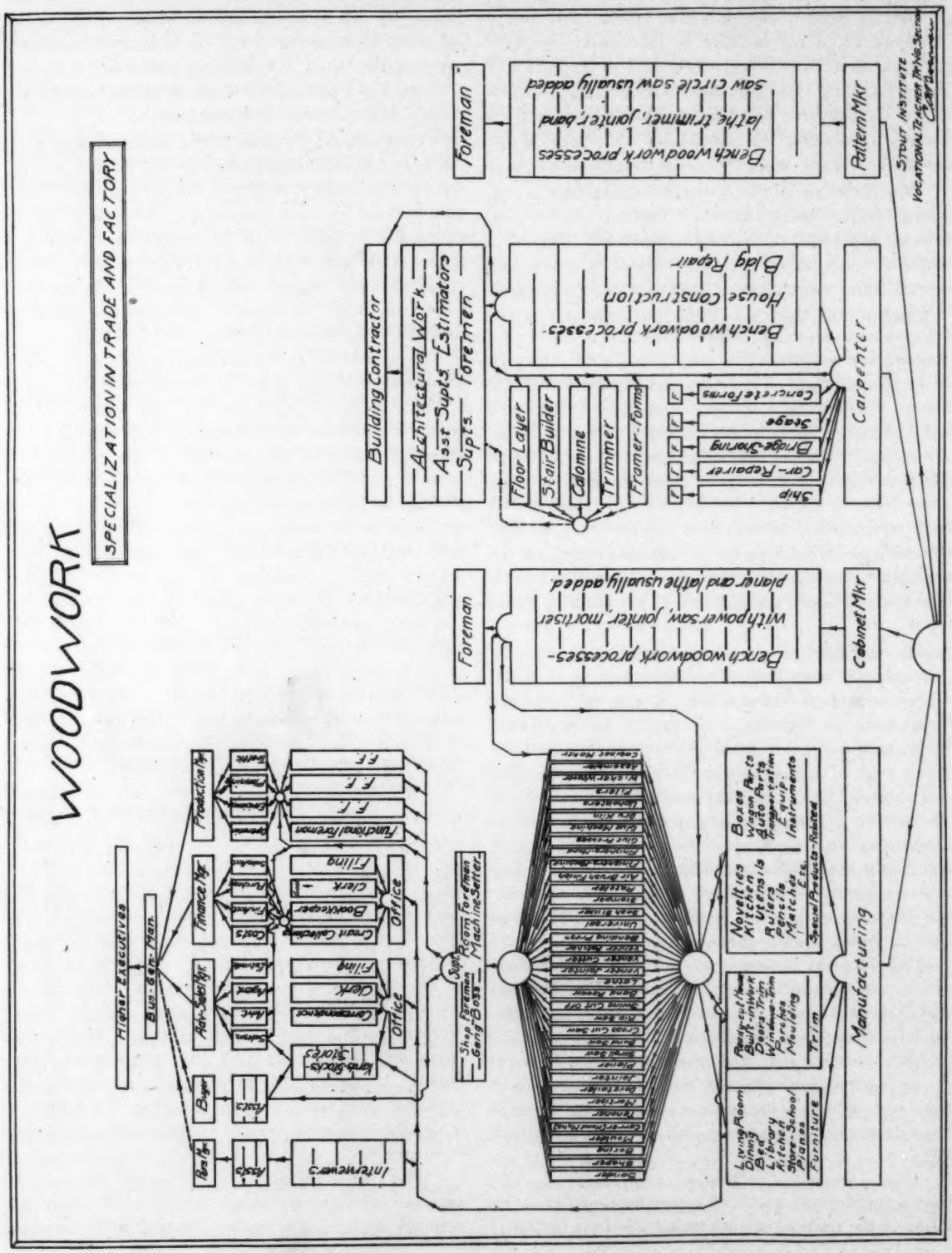
In a scrutiny of the machine operating we find a considerable number of standard machines, some, or all, of which are found in any woodworking factory. Travel from these *may* be into the somewhat interlocking field in which are found the machine setters, gang bosses, room foremen, shop foremen, and the superintendents. Possible travel from this field is again in two directions one being to the production department with a possible branching into the advertising and sales, and the other into the buying. Following the former we find entry into functional foremanship and into the under-executive work in advertising and sales. In the various positions in functional foremanship virtually all may lead to the under-executive work in the production department. It must be remembered that in indicating these probable lines of promotion travel that the chart must of necessity be somewhat conventionalized, special plants calling for adapting in some details.

In following the lines of entry into the business operation of wood-work manufacturing, as compared with machine operating, we find entry into four of the five large divisions of the business operation. These five large divisions are, production, finance, advertising and sales, buying, and personnel management. Of these there is possible immediate entry into all but the production. Executive positions in the production are usually filled from people who have had production experience. Following the lines of entry into the finance divisions certain lines indicate promotion travel while others indicate positions with little advancement opportunity. In the line of entry into the advertising and sales the office positions here are of such a nature as to present little advancement opportunity except within their own fields.

There are various ways and means for learning valuable information in any business. Peculiar importance is attached to certain kinds of work connected

with the duties of stock and store-keeping. It will be noticed that possible lines of travel are indicated from store-keeping positions calling for general and not specialized experience into both the selling and buying departments.

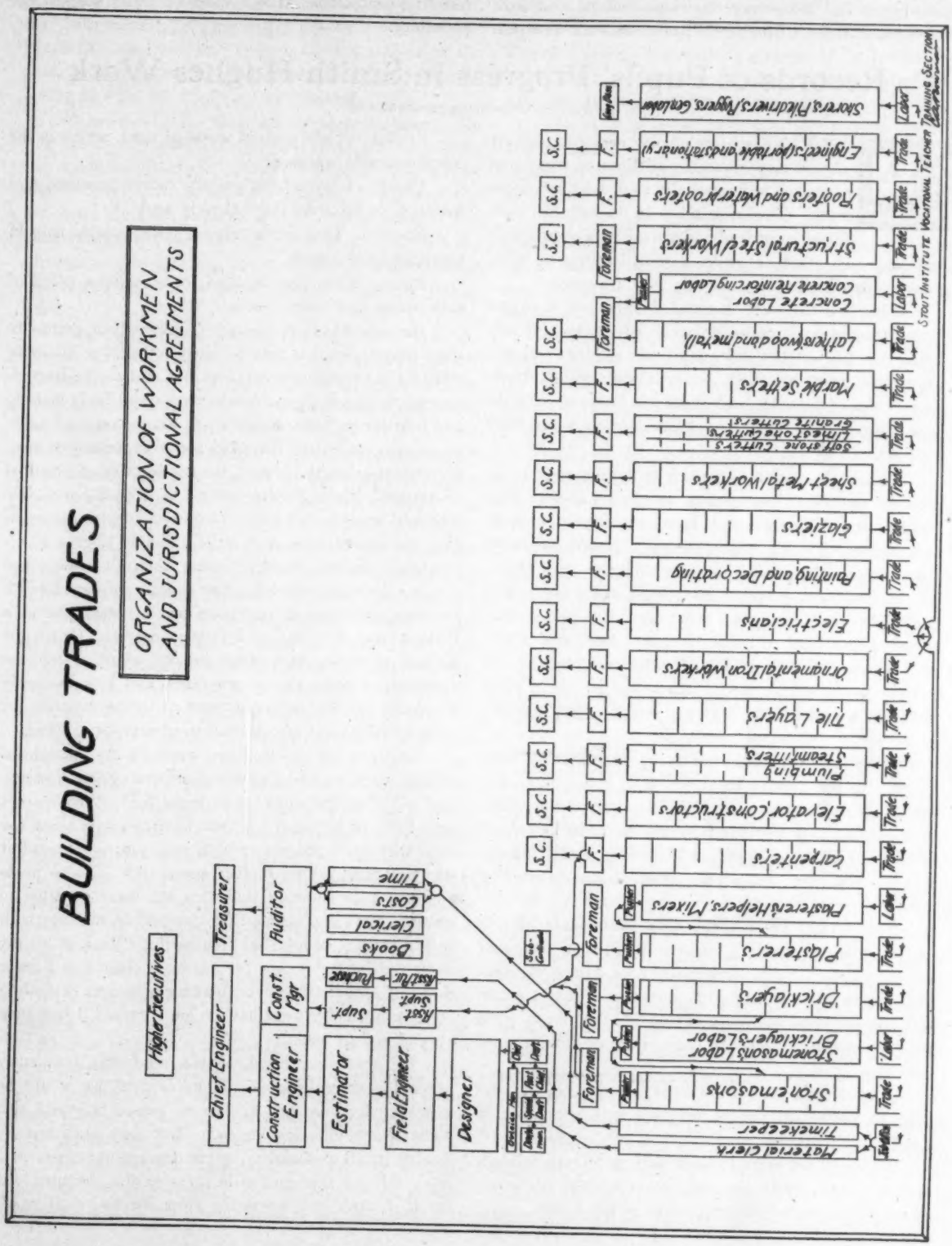
The work in the personnel department is of such a nature as to give certain competent individuals a chance for an interlocking experience which may lead to a direct advancement. The members in this department may be drawn from any field in the entire plant. The work of the personnel department is new, comparatively, and lines of travel have not as yet existed for a



long enough period to warrant conventionalization.

The Building Trades chart is based on classification by trades and occupations within a related group of eighteen trades and four labor groups. The four kinds of labor,—general labor, concrete and concrete reinforcing labor, plaster and stone mason's labor, and bricklayer's labor, are the usual groups. In a scrutiny of possible travel in these fields of labor it is noted that promotion leads either to gang boss or pusher. In some cases it is indicated that the pusher may secure openings in the trade work.

Reading from right to left on the chart it will be



noted that trade groups over to and including elevator constructors, are usually in fields where the work is taken on sub-contracts. Beginning with carpentry it is noted that, while carpentry and plastering lead to sub-contracting sometimes, carpentry may also lead from foremanship to work of building superintendents. The bricklayers and sometimes the stone masons also have some possibilities in the line of travel to work as building contractors. At the extreme left the two kinds of work in job offices, namely time keeping and material clerk, are indicated, with the kind of work which they may lead to in a large building contracting firm. In the upper left part of the chart is the conventional representation of the business organization of the larger building contracting firms. Lines of travel are self explanatory.

(*Concluded in March Issue*)

# Records of Pupils' Progress in Smith-Hughes Work

**Edward H. Crussell, Sacramento, Cal.**

ACCURATE records of past performances are of vast importance in all lines of vocational education and especially so in Smith-Hughes work. This article has to do with the matter of records of individual pupils' progress, and may well start out with a consideration of what these records need to be, and why they are needed.

*What Is a Record?* A broad definition of a record is; anything that supplies *accurate* information of any kind. Clocks, watches, calendars; gas, electric, and water meters; rules, measures, scales; thermometers, drawings, tables of formula—all these are forms of records, and in every case their usefulness depends upon their accuracy.

Accuracy is the all-important thing in a record; inaccurate records are worse than no records at all. This truth must be firmly fixed in mind, because the temptation to favor oneself by doctoring the record, is always there and is at times almost irresistible.

*Record Forms Should Be Simple and Easy to Fill Out*: Accuracy being so important, the complicated record, being hard to understand and more difficult to keep because of its complexity, is not so good for our purpose as the simple record which will tell us in plain words, or simple grapic form, just exactly what we want to know.

Many record forms in use in the schools today, have nothing to recommend them but their complicated appearance, and as the man who fills them out is often in a position to know that they will never be looked at, or checked up, after they are turned in, small wonder that he fills them out at the close of the month "by guess."

The schools are not the only delinquents in this matter, however, modern business is often as bad, and sometimes worse. The writer has seen dozens of high-priced men at work compiling statistics of maintenance and upkeep, these statistics having for their base, written information supplied by some illiterate foreign-born laborer.

*Why Records Should Be Kept*: Records of the progress of individual pupil's progress have a number of uses:

*First*: They serve to show both pupil and teacher, how far the former has progressed toward his goal; which is, the successful completion of the course.

*Second*: They prevent waste of time, which is the one irrevocable waste.

*Third*: They help to prevent future mistakes, and enable us to profit by those already made.

*Fourth*: They are an almost indispensable help in planning future work.

*Fifth*: They may be used for creating a spirit of enthusiasm and competition.

*Records Show Progress*: Taking these points in their proper order, it may be suggested that in all probability the average teacher does not realize the importance of letting the pupil know what speed he is making and how far he has traveled along his chosen road. Let us imagine ourselves traveling along an unknown road of indefinite length, toward the distant city of "Skilled Workman", where we are assured of a good job at fair wages, if we can only complete our journey in a reasonable amount of time, and with a certain degree of efficiency. As we tramped along thru the dust, and climbed the numerous hills, how eagerly we would watch for some guidepost or milestone which would give us a little information in regard to our progress. Or, in the absence of these, with what joy we would watch the approach of some chance wayfarer, and how earnestly we would ply him with questions as to the distance yet to be traveled, and of our chances of arriving in time.

And suppose our wayfarer assumed the attitude of certain teachers, and instead of answering our question said: "What do you want to know for? Why do you need to know how far it is; you have to travel all of the way; why don't you get on with your journey instead of standing here asking foolish questions? You've made a pretty poor showing thus far, and have no time to waste." Isn't it probable that many of us, meeting with such a setback, would feel like saying, "Well, if all my work and struggles thus far are to be classed as a 'poor showing' and if there is no manner of means of finding out how much farther I have to go, I guess I'll just turn around and go back."

On the other hand, if the road was frequently marked with milestones and guideposts, we would be watching for each one and as we passed it would say, "That's one mile less to go." Not only that, but we would, in all probability, begin timing ourselves, saying: "I did that last mile in seventeen minutes, I'll see if I can't cut down the time for the next one."

When we met a traveler, instead of asking how far it was to town, we would be plying him with questions concerning the conditions of the road, and how best we could overcome the difficulties.

*Records Save Time*: Time, is the one thing above all others invaluable, just as it is the one thing we most carelessly waste. Money and material things, tho lost, may be regained, but time lost or wasted is gone forever. Much has been said and written on this subject in the past, so much, that we would only be *wasting time* in trying to offer anything new or different.

*Records Help Us to Profit by Our Mistakes*: He who has never made a mistake has never made anything else worth mentioning. "To err is human", and a man may be forgiven if he makes a mistake thru lack of experience; the unpardonable sin, is for him to make the same mistake twice. Records serve to prevent this occurrence and by pointing out why, and how, the mistake was made, help us to avoid similar errors in future work.

*Records Help in Planning Future Work*: It is absolutely impossible to plan future work without records of some kind. All knowledge is based upon past experience, and past experience is nothing but a system of records, mental or written, chiefly mental. It is no more possible for us to plan future work without some record of past work, than it is possible for us to describe a color we have never seen, or a sound we have never heard. As already stated, our records of past experience are chiefly mental, and we have only to consider how important these past experiences are, to realize how much better written records would, in most cases, serve our purpose.

*Records May Be Used for Creating a Spirit of Enthusiasm and Competition*: And for this purpose they do not always have to be records made by others. Many a pupil—yes, and many a teacher—has been able to increase his efficiency by striving each day to beat the previous day's record. A reputation for skill in any trade or calling is not obtained by chance, that you are found reading this article is evidence of a desire on your part to advance in your chosen line, and scarcely any one thing will help you further along this road than a system of accurate records.

To sum up, records may be likened to milestones along the road to success; milestones and guideposts combined, for they measure the progress, show its direction, point out the short cuts, and warn against wrong ways and methods.

Having done our best to prove a reason for the keeping of records, we will now discuss the means by which they may be kept. The two general methods are: bound book form, and loose-leaf or card system. The card system has all of the advantages of the bound book without its attending drawbacks and is undoubtedly the best for our purpose.

To many people the loose-leaf, or card system, carries the idea of something that is complicated or mysterious. This is all wrong, there is nothing more mysterious about a card system of records, than there is about one kept in a book, but the card system is a great deal more convenient. Briefly, the system is merely one where all the deadwood is eliminated, and where all the records pertaining to one thing, or person, may be kept together, whether they be few or many. A big thing in its favor, is, there is never any need of starting the same record in another place when the alloted space is used up. The card system is essentially a system of units that may be added to, or subtracted from, without interfering with the arrangement of the remainder.

The cards may be indexed in any manner desired, and by means of various classes of guides and tabs, it is possible to provide two or more cross indexes in the same file.

Another good feature of the card system is its adaptability. If a list of names is arranged in alphabetical order, and it seems better to change to some other arrangement, it is merely a matter of providing proper index cards and re-filing.

We come now to the discussion of what records should be kept. The present article will be confined to the records needed for keeping track of each individual pupil's progress and workmanship, leaving the matter of tools, equipment, materials, etc., until a future time.

The records which seem absolutely necessary are:

(1) A daily job card or slip,
(2) A monthly record card,
(3) A record card for the semester.

*The Daily Job Card*: Should be as simple as possible in form, and with chances of misinterpretation reduced to a minimum. It should be designed with the idea that it is to be filled out by the pupil, and should have space enough for him to set down exactly what he was working on, and how much he did. There should also be places for the instructor to mark the grade of "speed" and "workmanship" and the hours credit, all of which may be taken care of on a card, or slip, 3 by 5 inches in size.

BROADWAY HIGH SCHOOL
FOUNDRY TIME CARD

DATE_____ PERIOD_____ NAME_____

| Job No. | No. Pcs. | Description of work | Time Hrs. | Time Min. |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

UNIT DIVISION_____ CREDIT HRS._____ TOTALS
WORKMANSHIP_____ SPEED_____

Fig 1. Daily Job Card

A previous article pointed out that a course in Smith-Hughes' work, should be divided into units and subdivisions of units; the matter of indicating which unit, or division, the work listed on the job card belongs to, may be handled in two different ways: a space may

be provided on the printed card in which the unit letter and number may be marked with pen or pencil; or the unit letter and number may be marked directly on the face of the record with a rubber stamp. The job card, shown in figure 1, is arranged for the first method. The job cards are best kept on file in a drawer behind an index card, on which is the student's name, address, age, date of entrance, occupation of parents, and any other information concerning the pupil that it may seem advisable to have.

*The Monthly Card*: This card is used for a periodical checking of the pupil's credits, and forms a means of advising his parents of his progress. The form for this card is not important, but it seems well to point out that it is usually made much too large, which causes it to get crumpled and broken in its journey to the home and back again. Three by five inches is large enough for this card also.

*The Record for the Semester*: This is best kept by the graphic method, in which a line or curve, will tell at a glance, just exactly what you want to know.

This card may be arranged in various ways, one of which is shown in figure 2. At the top of card the name of the school, the trade being taught, instructor's name, student's name and other desirable information may be provided for. At the left margin a space is provided for writing in the unit letter and number. At the right margin there should be columns for (1) the estimated number of hours required for the completion of the unit and (2), the actual number of hours worked. The major portion of the card is divided into small squares or rectangles, each one of which represents one hour. A line drawn across a square, shows one hour's work in that unit, and a line drawn clear across the card, or to the necessary square, shows the completion of that unit. Some of the unit divisions may need more than one line of squares; this is arranged for by taking another line, the last square being indicated by "X", or by blacking in a square, or in any manner desired. The hours shown in the squares are credit hours; that is, if a student works seven hours and does only five hours' work, five hours is all he is credited with. On the other hand, if he does seven hours' learning in five hours, he is credited with seven hours. If desired, both credit hours and actual hours may be indicated on the semester card, by merely using two colors of ink; say black for actual hours and red for credit hours. The grade for speed and workmanship for each unit division, is marked in the column headed Gr. Some pupils have plenty of speed but are low in workmanship, others do good work but are low in speed; the grade markings on the daily job card, should stress each pupil's need.

The method of judging and awarding grades is not touched upon in this article because the writer has some doubt as to whether other educators would find any merit in his methods.

Those who are interested in the devising of record forms, are advised to study the various forms to be found in the business world, one of the simplest and most efficient of which is the street car transfer, on which can be shown, the day of the month, time of day, where from, where going, and a number of other things, by merely punching two or three holes in the paper.

*Conclusion*: Records to be of any use must be accurately kept. The less work there is in keeping them, the more likely they are to be accurately kept. Finally, do not pin all your faith on an elaborate system of records; the record is not the important thing, what is important is, that you should learn everything possible from the record. Records themselves are of no value if you file them away and never look at them; their value to you depends upon the use you make of the information they supply.

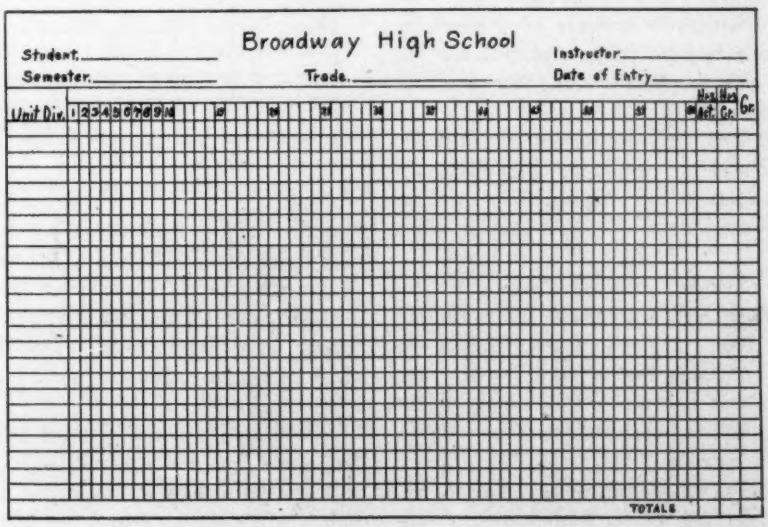


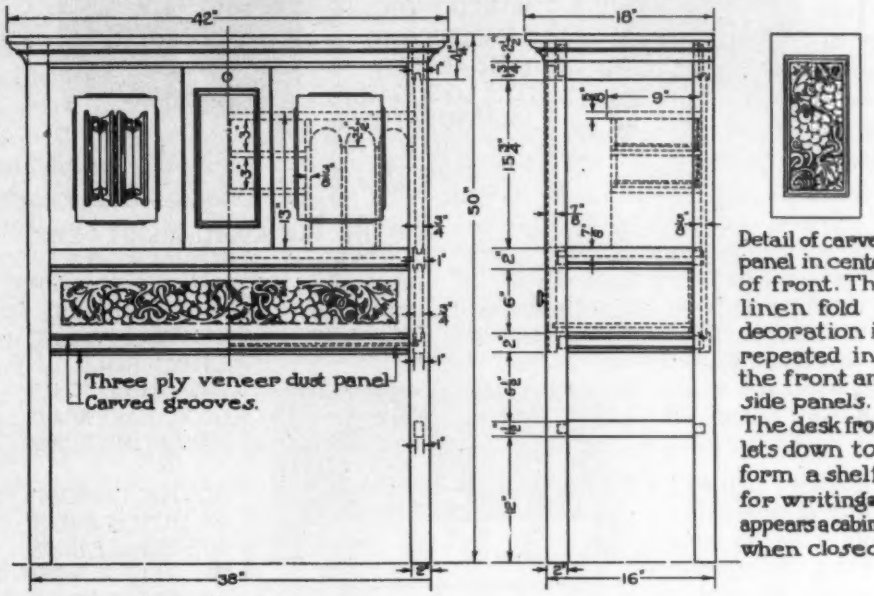

Fig. 2. Monthly Card.

# GOTHIC FURNITURE

Leslie G. Martin

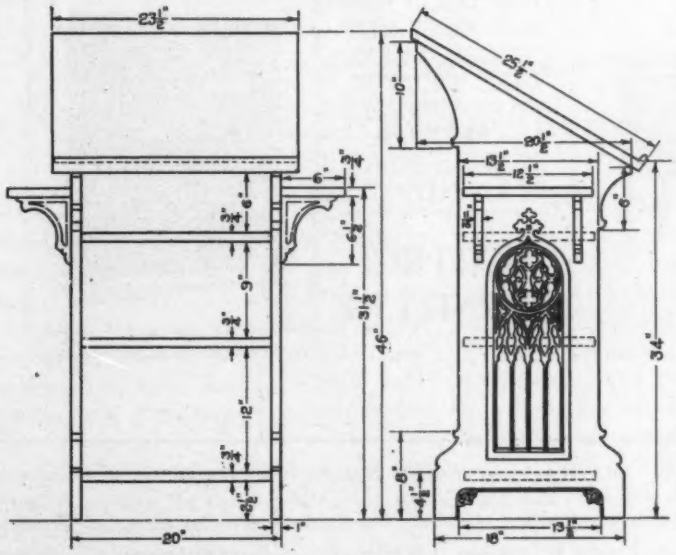
GOTHIC furniture and architecture of the 15th and 16th Centuries show many interesting examples. The houses had large rooms and were divided into great halls, living rooms and bedrooms. The hall usually contained a large fireplace and grouped around this were a few chairs, a chest or a long bench, built with a high back and top for excluding draughts. A long table and a side table were usually included also. There were few forms of furniture in use at this time. Some pieces were painted and others decorated with cushions or hangings of tapestry.

## GOTHIC WRITING DESK




Detail of carved panel in center of front. The linen fold decoration is repeated in the front and side panels. The desk front lets down to form a shelf for writing and appears a cabinet when closed.

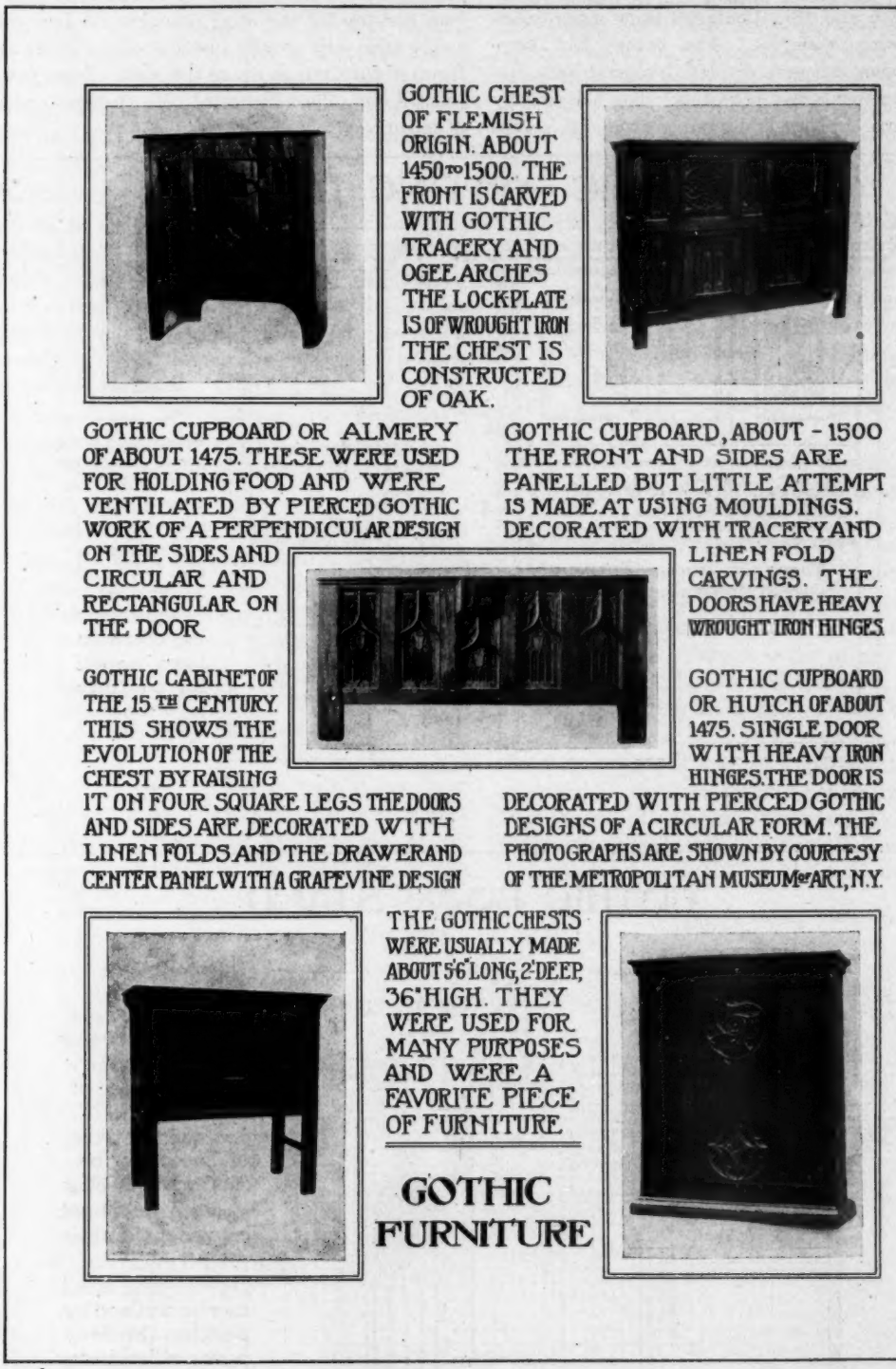
## GOTHIC BOOK STAND




The book stand is designed with a slanting top to hold a dictionary or other large book. It may be constructed of oak or walnut. If desired the side shelves may be omitted and a Gothic panel of greater height carved on the sides. An attractive polychrome effect may be obtained by painting the deep parts of the carving with antique red, green and gold.

Details of Typical Modernized Gothic Furniture.

The dining room and bedroom were often combined and elaborate in some of the finer houses. The wall panels were often painted. The furniture included a table, a buffet, a wash stand, a bed and a prayer stand. Stools were also quite common. The floor was sometimes covered with rushes. This was considered one of the most important rooms.


GOTHIC CHEST OF FLEMISH ORIGIN. ABOUT 1450 TO 1500. THE FRONT IS CARVED WITH GOTHIC TRACERY AND OGEE ARCHES THE LOCKPLATE IS OF WROUGHT IRON THE CHEST IS CONSTRUCTED OF OAK.
GOTHIC CUPBOARD OR ALMERY OF ABOUT 1475. THESE WERE USED FOR HOLDING FOOD AND WERE VENTILATED BY PIERCED GOTHIC WORK OF A PERPENDICULAR DESIGN ON THE SIDES AND CIRCULAR AND RECTANGULAR ON THE DOOR
GOTHIC CUPBOARD, ABOUT - 1500 THE FRONT AND SIDES ARE PANELLED BUT LITTLE ATTEMPT IS MADE AT USING MOULDINGS. DECORATED WITH TRACERY AND LINEN FOLD CARVINGS. THE DOORS HAVE HEAVY WROUGHT IRON HINGES
GOTHIC CABINET OF THE 15 TH CENTURY. THIS SHOWS THE EVOLUTION OF THE CHEST BY RAISING IT ON FOUR SQUARE LEGS THE DOORS AND SIDES ARE DECORATED WITH LINEN FOLDS AND THE DRAWER AND CENTER PANEL WITH A GRAPEVINE DESIGN
GOTHIC CUPBOARD OR HUTCH OF ABOUT 1475. SINGLE DOOR WITH HEAVY IRON HINGES. THE DOOR IS DECORATED WITH PIERCED GOTHIC DESIGNS OF A CIRCULAR FORM. THE PHOTOGRAPHS ARE SHOWN BY COURTESY OF THE METROPOLITAN MUSEUM OF ART, N.Y.
THE GOTHIC CHESTS WERE USUALLY MADE ABOUT 5'6" LONG, 2' DEEP, 36" HIGH. THEY WERE USED FOR MANY PURPOSES AND WERE A FAVORITE PIECE OF FURNITURE
GOTHIC FURNITURE

Typical Pieces of Gothic Furniture.

Chests were favorite pieces of furniture and were used for many different purposes. They were sometimes used for beds, for seats and also for holding food and

household goods while travelling. As a rule they were quite large and carved in low relief on the simple types, or with traceried window designs with ogee arches, elaborate crockets, and spandrels filled with tracery on some of the finer chests. The linen-fold pattern was used quite extensively as well as the Gothic trefoils and grapevine motifs.

The linen fold decoration was a typical decoration of Henry VIII, (1509-1547). It suggests the folding of a linen napkin. It was used in the decoration of panels, chairs and different forms of furniture. It had many variations. Panels carved with portrait medallions or "Romayne Work" were also used at this time. The chests were usually heavy and constructed with dovetail joints at the corners in some types. Heavy iron handles were sometimes used on the ends, and the lock plates were often beautifully wrought in iron.

Many terms used in connection with Gothic furniture are inter-changeable, as the following, dresser, buffet, sideboard, cupboard and credence. The cupboard was used for holding various things, the dresser was used both in the kitchen and dining room for holding food and dishes, as were the sideboards and buffets. The Court Cupboard was usually low and used for holding large pieces of plate. The livery or dole cupboard was used for holding food that was given to the poor. It was called "hutch" in the latter part of the period.

Many armories or livery cupboards were built with Gothic tracery designs cut entirely thru for purposes of ventilation. Others had panelled fronts, as shown in the photographs, with a single door in the center and panels on each side. They were usually fitted with two or three shelves inside. The carving sometimes took the form of windows carved with perpendicular designs while the doors might be carved with circular or spiral designs. Mouldings were used very little and they were often quite plain altho some of the Gothic cupboards carved with pierced Gothic work were very rich in appearance. Some were made with turned feet and were slightly raised from the floor. Other cupboards or hutches opened with two doors which were hung within beautiful hinges. The door framing was usually wide and the construction of a bold type.

The side tables used in the dining rooms late in the century were of an elaborate type, painted and gilded. Tracery designs, shields or a coat of arms, were often used. They were very substantial in construction and rather crude in some cases. The front was usually divided into three panels, each carved with a different design. A deep channel moulding was often run up the legs and across the lower part of the front.

The high back seats used in the living room were often built so that the back formed a part of the wall panelling. The top or canopy was often beautifully carved as were the supporting posts and seat arms. Tracery and flower motifs were used in the carving.

The tables were usually of the trestle type and quite heavy. The Gothic table of degrees was also in use. This was in the form of polygonal shelves built around a central pillar and growing smaller toward the top, like a pyramid.

The coffrette was also much in use. It was a form of small chest. Tracery carving resembling windows was a favorite form of decoration. These windows were sometimes of a five-pointed arch, subdivided into two lights. These might flow upward forming intersecting circles subdivided into pointed ovals filled with qua-trefoils and double tongue-shaped lights.

The English Gothic furniture is divided into three periods: That of the 13th Century had tall narrow window designs and ornament was used very little. That of the 14th Century, was called the Decorated. Tracery was used extensively and the designs were flowing and geometrical. The 15th Century Gothic work showed perpendicular tracery designs in the windows. Many excellent examples are shown in the English Churches.

## FIRST AID TO THE INEXPERIENCED—VI

# THE SELECTION OF EQUIPMENTS

S. J. Vaughn

TOO often, equipments are bought from "standardized lists of manual training tools." This method disregards the special needs of the local community, the definite work to be done, and the courses to be pursued; and seems to be followed simply because somebody, somewhere, at some time, said that certain tools were good things to have, if you're going to teach manual training.

It seems to me to be a wise procedure in selecting a definite equipment, to take the three following steps:

1. Formulate a very definite statement of the kinds of work to be undertaken, the purpose of the work to be done, and the courses to be pursued.

2. Plan an ideal equipment to meet the statement indicated in step number one without regard to cost, housing facilities, or other local considerations.

3. Modify the ideal equipment to meet the limitations and the needs of the local situaton.

As suggested in step number one above, there are three fundamental and controlling factors that determine in a general way the character of the equipment for any line of manual or industrial work.

1. *The kinds of work to be offered constitute the first factor.* If one were called upon to equip a building even for elementary industrial work, one would be confronted with the problem of selecting from the long list of possible lines which might be selected, those lines

peculiarly fitted to meet the local needs and to offer the best advantages for both pupils and teachers. It is surprising the number of calls that come from manual training teachers for help in selecting equipments for manual training work. But it is still more surprising that the calls are almost invariably general and indefinite, not specifying the kind or kinds of manual training for which equipment is to be planned. Of course, it is understood that when most people speak of manual training, they think of woodworking of some sort, but this is a most narrow conception which needs immediate correction.

Very successful work is now in progress all over the country, even in the grammar grades, in bench work, pattern making, printing, sheet metal, jewelry, cement work, electrical construction, carpentry, etc. Hence, to speak of an "equipment for manual training" is to speak so indefinitely as to render it quite impossible for one to offer intelligent assistance or advice.

It is not only necessary to specify the general field or character of the work to be done, but it is also quite essential to particularize with reference to the exact division of the general line to be undertaken. Thus, it is not sufficient to say that one wishes to equip a wood working shop, since there are different lines of woodwork that require equipments that differ in certain essential details. A pattern maker's shop differs materially in point of equipment from the carpenter's shop, and the cabinet maker's shop has certain features of equipment that distinguish it from both the other two. The more clearly, therefore, the teacher defines the exact work to be done in the proposed shop, the less difficulty he will experience in planning his equipment. Of course, there is, and of necessity must be, a kind of all-purpose shop in which various kinds of work must be carried on and for which a kind of composite equipment must be provided. This fact, however, does not alter the general principle that the specific kinds of work to be done must determine in large measure the equipments to be selected.

2. *The second large factor that determines the general character of the equipment is the exact purpose of the work to be done.* It may make a very great difference in the equipment for a particular line, especially in the high school, whether the work is to be given as a part of general education or is to be placed upon a vocational and productive basis. Much of the fault and failure of the industrial work thus far has been due to the lack of definite, well stated, and well understood purposes. There are large high schools offering courses in "vocational cabinet making" in the shops where the planer and band saw are the only machinery where the work is entirely individual, and where the operations are almost exclusively hand processes. One case in point is where perfectly wonderful pieces of furniture were being made from original designs by the craftsman method, where the band saw was the only machine in the shop, and yet the principal boasted that the work was "strictly vocational." This is no reflection on the work; it is simply pointing out the perfectly apparent fact that purposes and equipments are sometimes total strangers. Gigantic blunders have been committed in the matter of equipment thru the failure to discriminate between the purposes for which the work might be given. There have been some striking examples of over-equipment, considering the uses to which the equipments have been put. And, of course, at the other end of the line stand the prevailing difficulties of the inadequacy of equipment. But in any case, before an intelligent judgment can be formed as to over-equipment or under-equipment or special fitness of a particular equipment, there must be a perfectly definite statement of the purposes which the given equipments are supposed to serve.

3. *The courses of study to be pursued furnish the third general factor.* This factor is not so fixed, so capable of brief, definite statement, or so influential in the determination of the general lines of equipment as the other two, and yet a reasonably comprehensive notion as to the basic principles and the limitations of the proposed courses of study seems absolutely essential to a wise selection of equipment for any line of work. Even tho the kinds of work to be done have been decided upon and the purposes of the work clearly set forth, the actual selection of the equipment might be materially affected by the courses of instruction to be followed. For instance, it would necessitate one kind of equipment for a shop in which abstract, illustrative exercises were the sole basis of the course, as was the case in the early days of manual training. A considerably different equipment in certain essential details would be required for a shop in which finished work of a more pretentious character is carried on. A course of work built upon the productive idea would require still other modifications of equipment.

In the light of the foregoing principles or factors, the practice of certain school boards and superintendents, who make no profession of understanding such principles, of purchasing equipments without asking for the specifications and advice of their own chosen experts, appears in all the ugliness of its officious and bungling absurdity.

If there were no other limiting conditions than those indicated in the foregoing three factors, the task of selecting equipments would be very much simplified. But even with so few determining factors, it is no small matter to undertake to plan an ideal equipment. I have repeatedly asked classes of inexperienced, prospective teachers what they considered an ideal equipment for a high school cabinet making class of twenty students, and received the reply that "an absolutely ideal arrangement would provide a complete equipment for each student." When asked if in selecting an ideal equipment, they would buy twenty band saws, twenty jointers, and twenty glue heaters, they immediately

discovered that they hadn't said exactly what they meant.

What they had meant to say, and what is perhaps a good working definition of an ideal equipment is "One that enables each student to have access, without delay or loss of time, to the necessary tools for the performance of the work in hand." Hence, the matter of access to tools and machinery is not only a question of equipment but one of organization as well. If all members of the class wanted to perform the same operation, with the same machine, at the same time, there would be delay, loss of time, and confusion; but such a situation is easily avoidable by a simple matter of organization.

If it is not an ideal equipment where the students must remain idle because of the lack of proper access to the needed tools and machines, neither is it an ideal equipment where a large proportion of the tools and machines remain idle because of the lack of the necessary number of students and constructive processes to keep them employed. It would, therefore, be the height of wasteful folly and very far from an ideal arrangement for each student to be provided with a complete outfit of tools and machinery. Hence, in selecting an equipment or any part of it, the wise purchaser will always take into consideration the possibility of such equipment's being a kind of needless luxury with only an occasional use.

**Selecting an Ideal Equipment.**

Let us suppose that the problem is to select an equipment for an eighth-grade shop. After some investigation of local social and industrial conditions, we have decided that it shall be a wood working equipment, and that the three large, fundamental considerations are as follows:

1. The work shall consist of the usual simple wood working commonly designated as elementary benchwork or cabinet making and carpentry.

2. The purpose shall be to give certain information and types of experience in industrial fields, for general education and guidance.

3. The course of study shall be based upon the problem-project method and shall consist of projects ranging in difficulty from simple two-dimension work to the more advanced types involving mortise and tenon construction.

In order for an individual to perform all the processes required in such an outline of eighth-grade work, it would be necessary for him to have access to the complete list of hand tools and machines required to perform the work. If two individuals were working together and were to attempt to do exactly the same processes at the same time, they would require two sets of tools. However, if they were to organize their work so that while the first workman was performing one operation, the second workman would be performing an operation requiring an entirely different tool, the two could work together to the advantage of both with the duplication of but few items of the equipment.

Bnt when a group of individuals work together, it then becomes a question as to the number of individuals that may have access to a single tool without interference and confusion. There are the individual or constant tools which each person is continuously in need of, while there are the general, supplemental and occasional tools to which each workman needs but infrequent access. Hence, the whole equipment for this sort of woodworking may be grouped under four heads, as follow:

1. *The constant tools without which the individual is unable to work to advantage.* These include bench, plane, saw, trysquare, marking gauge, ruler, and bench hook.

2. *Those large fixed pieces of equipment for common use in the preparation and care of stock and tools for the work.* These include saw table, planer, tool grinder, glue heater, cabinets, etc.

3. *Frequently used general or supplemental tools one of which will supply the needs of a group.* These include various sizes of saws, cabinet clamps, block planes, counter sinks, jointing planes, drill bits, steel squares, etc.

4. *Special tools for meeting the occasional or unusual needs.* These include draw knives, spirit levels, T-bevels, expansion bits, wrenches, hand axes, etc.

The ideal equipment will contain a very large number of tools for the exclusive use of the individual, and will, of course, include some of the larger and more expensive pieces of equipment in the nature of machinery, both of which items must be materially modified in the less expensive lists that are adapted to local conditions.

The following list is offered as a tentative ideal equipment for a class of twenty eighth-grade pupils. It is not presented as "the one and only" or even "the best", which are always the slogans of the narrow, opinionated man. But this list is offered simply as a working hypothesis from which to proceed in order to arrive at some general notions as to the method of making up lists of equipments for very definite situations. If anyone is disposed to argue the matter, I trust that the argument may be on the general principle of procedure rather than upon specific items in the list.

**The Constant or Individual Tools.**

20 single, cabinet benches with rapid acting vises.
20 jack planes, 14 inch.
20 smoothing planes, 8 inch.
20 block planes.
20 trysquares, 8 inch.
20 two-foot rulers, ⅛", ¼", ½".
20 marking gauges.
20 back saws, 12 inch.
20 bench hooks.
20 cross cut saws, 22 inch, 8 point.
20 rip saws, 22 inch, 7 point.
20 bell faced hammers.
20 plain braces, 5 inch swing.
20 socket chisels, 1 inch.
20 socket chisels, ½ inch.
20 steel frame coping saws.

20 wood files, 10 inch.
20 wing dividers, 6 inch.
20 screw drivers, 8 inch.
20 oil stones, 1″x2″x8″.
20 oil cans, ½ pint.
20 ea No. 4, 7, 12 auger bits.
20 nail sets, cup point.
20 cabinet scrapers, 3″x5″.
20 ea No. 4, 5, 6, 7 wood drill bits.
20 mallets, 3″x5″.
20 bristle bench brushes.
60 plane bits, smoothing.
60 plane bits, jack.

**Second Group: Machines, etc., for Common Use.**

1 universal saw table, motor driven.
1 planer, 18 inch, motor driven.
1 tool grinder, motor driven.
1 gas or electric glue heater.
1 tool cabinet.
1 stock cabinet.
1 cabinet for finishes.

**Third Group: General or Supplemental Tools**

4 rip saws, 26 inch, 5 points.
4 cross cut saws, 26 inch, 6 points.
4 carpenter's steel squares.
12 cabinet makers' clamps, 5 feet.
12 cabinet makers' clamps, 3 feet.
4 jointer planes, 22 inch.
4 burnishers for cabinet scrapers.
8 bit gauges.
6 ea Nos. 4, 5, 6, 7 wood drill bits.
4 spoke shaves.
1 set auger bits.
5 counter sinks.
4 ratchet braces, 6 inch swing.
4 T-bevels, 8 inch.
4 mortise gauges.
4 draw knives.
1 set socket chisels.
12 iron hand clamps, 8 inch.
12 adjustable hand screws, 14 inch jaw.

**Fourth Group: Special or Occasional Tools.**

2 hand axes.
1 pair cutting pliers.
1 spirit level.
1 nail pull.
1 monkey wrench, 10 inch.
1 tinner's shears, 3 inch jaw.
1 dowel plate.
2 Yankee drills.
1 set ea steel letters and figures.
1 mitre saw.
1 expansion bit.
1 saw set.
1 saw vise.
½ doz. saw files.
1 ea ¼″, ½″, ¾″ socket gouges, outside bevel.

**Modifying Factors.**

The three large, determining factors—kinds of work, purposes of work, and courses of study—presuppose and demand as has just been indicated, ideal and adequate equipments with which to put such plans into full and complete execution. Here, as always, however, there step in certain very practical considerations to modify, and sometimes to destroy, the ideal. Hear ye a parable: A certain prosperous city had an ambitious desire to span a nearby river with a pretentious bridge. After a heated campaign, the project was enthusiastically and overwhelmingly approved, but strangely enough the bond issue was decisively defeated. In another election, the bond issue carried, but only for a third enough money with which to build the bridge. After long and painful deliberation, it was finally decided that instead of building a bridge a third as pretentious as the one originally planned, it would be wiser to build one-third of the original bridge. And now this helpless and useless monument to an egregious blunder sticks majestically out over one-third the river and on its approach there appears this pathetic injunction, "Keep Off The Bridge." The city seems happy. The people got what they paid for and they proudly point to their "municipal grandeur and civic enterprise."

Almost every educational ideal has been so maimed in its conflict with "practical considerations" that it has had to hobble along on crutches or be borne thru life on a pedagogical stretcher. Many a great ambition and fine ideal has ambled its devious tho certain way to the potter's field, because of its lack of "practical" encouragement and sustenance.

The following are three practical considerations that enter into the matter of equipment selection to modify the ideal and to determine in large measure the amount, the kind, and, unfortunately, the quality of the equipment to be bought:

1. *The location and floor space to be occupied by the equipment.*

2. *The size and number of classes to be accommodated.*

3. *The amount of money available for the purchase of the equipment.*

After planning the ideal equipment for a maximum class of twenty without regard to cost or local limitations, let us undertake the task of modifying the ideal equipment to meet the following perfectly definite demands of a local situation:

1. Floor space 20 feet square.

3. Three classes a day of 16 eighth-grade pupils each.

3. Community able to furnish funds, but very conservative and somewhat skeptical regarding the work.

Under such circumstances, a teacher becomes a salesman who must sell his proposition to the community and, like all good salesmen, he must not oversell it. The reaction which follows every over-sold proposition, whether of mining stock or manual training, leaves a very difficult situation for any subsequent efforts. His purpose, therefore, will be to recommend such an equipment as will not seem extravagant to the community and at the same time will do substantial justice to the work in hand. Hence, the problem set by the above undertaking is to modify the ideal equipment to meet the given conditions, and yet to maintain as fully as possible the principle of accessibility which lies at the base of all good equipments. The process, then, is one of elimination and organization. Some of the general tools and the machinery must be eliminated, the number of purely individual tools must be materially reduced, many of those classified as individual tools in the ideal list must be placed in the general

group, while the special or occasional group must be made considerably smaller.

**Modified Equipment.**

Probably no two persons could agree on all the modifications necessary in order to bring the list within the requirements of the local situation; but the following is a serious, even if it should prove to be an ineffective attempt to apply the principles of the modification of an ideal to meet the limitations of the real. This list may be bought even at the present market price for $850.

**First Group: Constant or Individual Tools.**

8 double cabinet benches, with rapid acting vises.
16 smoothing planes, 8 inch.
16 two-foot rulers, $\frac{1}{8}$″, $\frac{1}{4}$″, $\frac{1}{2}$″.
16 trysquares, 8 inch.
16 marking gauges.
16 screw drivers, 8 inch.
16 back saws, 12 inch.
16 braces, plain, 5 inch swing.
16 bench hooks.
16 ea Nos. 5 and 7 auger bits.
16 chisels, $\frac{3}{8}$″.
32 smoothing plane bits.

**Second Group: Fixed Pieces for Common Use.**

1 tool grinder, motor driven.
1 glue heater.
1 tool cabinet.

**Third Group: General or Supplemental Tools.**

6 rip saws, 22 inch, 7 point.
4 cross cut saws, 22 inch, 8 point.
12 cabinet makers' clamps, 5 feet.
8 cabinet makers' clamps, 3 feet.
8 jack planes, 14 inch.
4 bit gauges.
6 ea wood drill bits, Nos. 4, 5, 6, 7.
4 counter sinks, rose.
4 nail sets, cup point.
4 oil stones, 1″x2″x8″.
4 oil cans, $\frac{1}{2}$ pint.
8 bell faced hammers.
8 bristle bench brushes.
8 mallets.
4 braces, ratchet, 6 inch swing.
4 steel frame coping saws.
4 wood files, 10 inch.
4 wing dividers.
4 block planes.
1 set auger bits.
4 ea socket chisels, $\frac{1}{4}$″, $\frac{3}{4}$″, 1″.
8 iron hand clamps, 8 inch.
8 adjustable hand screws, 14 inch jaw.

**Fourth Group: Special or Occasional Tools.**

2 draw knives, 8 inch.
1 hand axe.
2 carpenter's steel squares.
2 T-bevels, 8 inch.
1 jointer plane, 22 inch.
1 monkey wrench, 10 inch.
2 spoke shaves.
1 mitre saw.
1 saw set.
1 saw vise.
3 saw files.
1 spirit level.
2 Yankee drills.
1 rip saw, 26 inch, 5 point.
1 cross cut saw, 26 inch, 6 point.

**Explanation of Modifications.**

When the specific conditions were first set forth, it immediately came to mind that the total cost of the equipment must be well under $1,000. This conclusion automatically eliminated the saw table, the planer, and perhaps a cabinet or two, because they alone would consume too great a proportion of the entire allowance.

The first step after this was to determine the number of constant or individual tools that seemed essential under the circumstances for 16 pupils. This list, which provides for all the essential operations by each worker, is found under the first group. It will be observed that double benches have been specified. The double bench has several arguments in its favor under any conditions. It occupies less space than two single benches, it is cheaper, its weight makes it more solid and substantial than the single bench, and it permits the workers to face each other, which fact is an advantage rather than a hindrance, if conversation is permitted among pupils during work hours.

The general or supplemental tools have been grouped for the most part on the basis of one tool for four workers, as in the cases of the cross cut saws, the braces, the oil stones, wood files, etc. In some cases, the proportion has been one tool to two pupils, as in the cases of the screw drivers, the jack planes, and the hammers. An apparent reversal of ordinary practice is found in the item of the rip saws where the number exceeds that of the cross cut saws. This is due to the fact that each member of the class is provided with a back saw, and since a very large amount of the sawing, excepting the stock cutting, is such as may easily and properly be done with back saws, it was thought wise to limit the number of cross cut saws to four.

The wisdom of such a distribution will depend somewhat upon the organization and method of work in vogue in any particular shop. In another article the different shop organizations and different systems of issuing tools to pupils will be discussed. It is sufficient to say here that the use of a tool room with an efficient checking system will materially modify the lists of equipment. It would reveal an interesting story if the data were available from some considerable city where the tool room and checking system are in operation. It would be much safer to draw general conclusions and lay down principles of procedure in equipment planning, if one had such specific information to work on as the exact number of pupils using a certain tool at each recitation, and the exact number of hours the various tools were used during a stated length of time. Perhaps some such investigation is already under way and we may hope to profit by it in the near future. Meantime we must rely upon our best judgment as formulated from years of study and experience.

**A $400 Equipment.**

Let us suppose that when this modified list of equipment costing $850 is submitted to the superintendent and the board of education, they are appalled at the cost and announce that the entire expense must be kept within $400. Here, then, we must face the proposition of abandoning the modification of our ideal which we

were previously compelled to abandon and to make plans, not to meet the dictates of those three original determining factors, but to contract our equipment until it comes within the $400 limit and still retain a sufficient number, variety and quality of tools with which to start the work in manual training. Those three fundamental factors will not change, the ideals will not yield, the floor space will not enlarge, the number of classes will not be altered, the size of the classes must remain the same, the $400 will not expand, the poverty or penuriousness of the board is eternal. There is but one flexible factor involved, and that is the equipment. It must reduce.

The following things must be done to the modified equipment.

1. The skeleton bench with a single drawer on each side must be substituted for the cabinet bench in the previous equipment.

2. The number of constant or individual tools must be reduced.

3. Some of the special or occasional tools must be eliminated.

4. The electric tool grinder and glue heater must be eliminated.

5. The bench hooks and tool cabinet must be eliminated or left for class construction after the work has started.

6. One general or supplemental tool must serve a larger group.

After these pieces of surgery have been performed on the previous equipment, the result is as follows:

**First Group: Constant or Individual Tools.**

8 double benches, skeleton with drawer and rapid acting vise on each side.
16 smoothing planes, 8 inch.
16 trysquares, 8 inch.
16 marking gauges.
16 two-foot rulers, $\frac{1}{16}$", $\frac{1}{8}$", $\frac{1}{4}$".

**Second Group: Fixed Pieces for Common Use.**

1 grind stone.
1 glue pot and gas plate.

**Third Group: General or Supplemental Tools.**

4 cross cut saws, 22 inch, 8 point.
4 rip saws, 22 inch, 7 point.
8 back saws, 12 inch.
6 bell faced hammers.
8 ea $\frac{3}{8}$" and $\frac{1}{2}$" socket chisels.
6 cabinet makers' clamps, 5 ft.
4 cabinet makers' clamps, 3 ft.
4 braces, plain, 5 inch swing.
4 wood files, 10 inch.
4 jack planes, 14 inch.
8 auger bits, $\frac{3}{8}$".
4 ea auger bits, $\frac{1}{2}$" and 1".
4 oil stones, 1"x2"x8".
4 oil cans, $\frac{1}{4}$ pint.
2 nail sets, cup point.
2 counter sinks, rose.
4 wing dividers, 6 inch.
8 screw drivers, 8 inch.
4 bit gauges.
4 ea wood drills, Nos. 4, 5, 6, 7.
4 mallets.

**Fourth Group: Special or Occasional Tools.**

1 brace, ratchet, 6 inch swing.
1 coping saw, steel frame.
1 carpenter's steel square.
1 saw vise, 10 inch.
1 saw set.
2 saw files, 6 inch.

If the demand had been to reduce the equipment to one costing $300, the process of elimination, substitution, and the simplification of the equipment without altering the essential quality of the separate items, would have been carried on until another $100 worth of tool value had been whittled away from the original list.

It is seldomly, if ever, wise to attempt to reduce the cost of an equipment by substituting tools of poorer quality. In the long run, it is neither satisfactory nor economical. Yet one should not pay too much for the brand of a tool or machine. With tools, as with almost everything else, it is usually impossible truthfully to say, "This is the one supreme article that has no equal." As a matter of fact, there are several good brands of almost every tool or machine used. These matters, together with other equipments and the proper specifications for tool purchases, will be discussed more fully in a future article.

# A Practical Problem for the Drawing Class

**Rachel Skinner, High School, Champaign, Ill.**

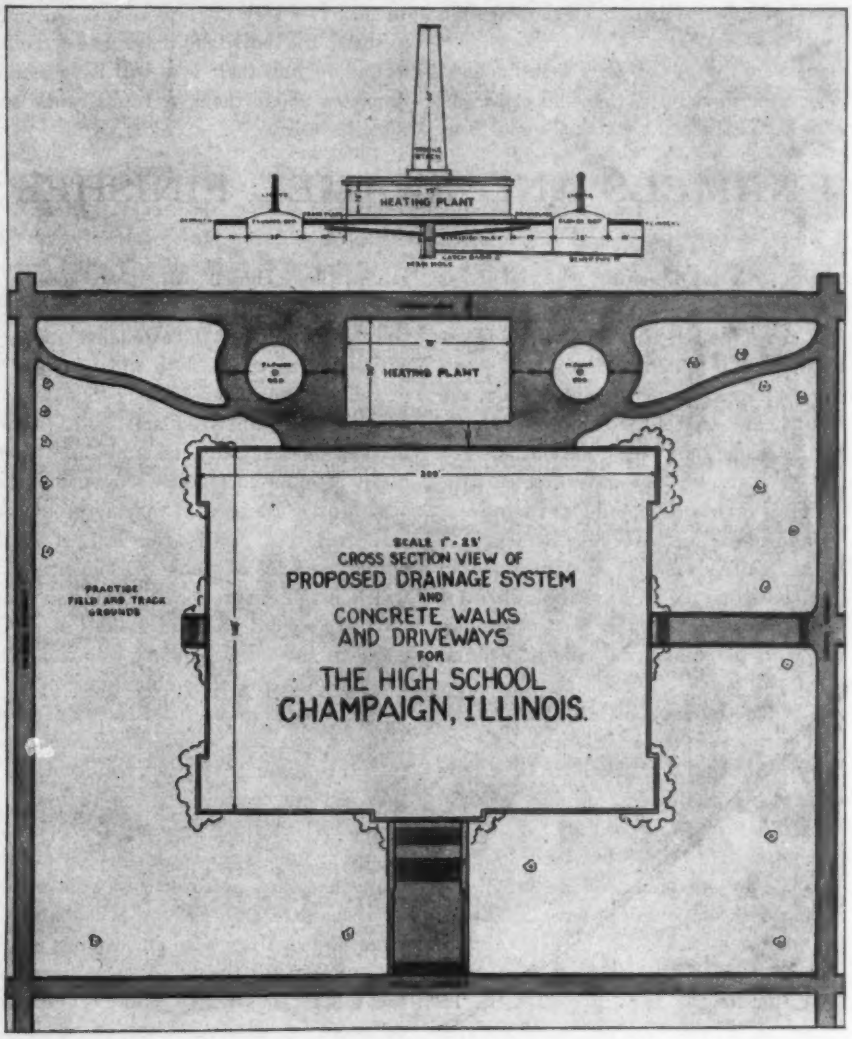
IT came indirectly to my notice that the board of education of Champaign, Illinois, was contemplating building some new walks and driveways at the rear of the high school. Because of inadequate funds it had not been possible to construct these when the building was completed. Thru the school engineer, I suggested to the board that the boys of the drawing classes be given the opportunity to plan the needed improvements, and that these, if satisfactory, be adopted instead of the plans of a professional architect. To this the board readily agreed. The chairman of the building committee came to the high school to discuss the matter. He gave us some suggestions which we gladly followed. Because the grounds had never been properly lighted, at the back particularly, he wanted us to plan a lighting system. Altho the grounds around the front of the building were fairly well drained, those at the rear were not, and he wished us also to plan for these improvements.

I described the situation to the boys in my classes, taking them out of doors to put the matter concretely before them. There were two back entrances, short cuts for students, which had no walks leading up to them. In rainy weather these paths were exceedingly muddy, doubling the work of the janitors. The boys were delighted with such a real, live problem, as it ap-

pealed to their love of the practical and definite, and at the same time gave them a chance to add to the beauty of their own school building. I told them that I wanted each one to work out his own individual plan, and that the eight best would be submitted to the board of education, who in turn would give the most appropriate to the contractor.

First the boys worked out some preliminary sketches. Then, with a long tape procured from the engineer, they made measurements of the building, the power house, and the amount of land around the school. They soon found that if they were to get the best results, their plans must be absolutely accurate in all details. For example, in their preliminary sketches they made the building rectangular in shape; when they came to measure accurately, they found that it was almost square; trees which they had thought covered two feet, in reality covered eight. For several days they went about the yard, drawing board and tape line in hand, jotting down the number of steps here, the exact location of that tree, or the shade cast by this clump of shrubs, until pedestrians stopped in amazement and exclaimed as they shook their heads, "Schools ain't as they used to be when I was young."

The engineer gave the boys helpful hints from time to time concerning the project; there was a flower bed on one side of the heating plant, so he proposed that we put one on the other side. This was a good idea, as it gave the proper balance and symmetry. He also gave valuable data on the drainage, describing very minutely what must be planned, a man-hole and all its essential parts. Fortunately there was a man-hole on the east side of the building, so the boys got a good conception of what was needed. We decided that the best way to show this drainage plan was to draw a cross-section view, which would give us as well a good idea of the placing and relative proportion of the flower beds and lighting system.




A Specimen Drawing of the School Site.

Of course the boys compared notes continually, criticised each other's work, and often got into disputes about the placement of various points, necessitating frequent trips out of doors. As was to be expected, one or two individuals were inclined to take advantage of the opportunity for wasting time, but I found that the rest of the class were as eager as I to prevent this. The large majority of the boys gave strict attention. They listened carefully whenever the engineer gave them any information, and their interest in drawing took a new lease on life when so practical a man as he showed such great interest.

When the plans were completed, they were fastened on the bulletin board for final inspection and criticism. Then all together selected the eight which seemed to us best from every point of view. These were sent to the board, and the one which is reproduced with this article was the final choice.

Altho the same problem will not be found in all high schools, a little ingenuity on the part of the drawing teacher will discover worth-while projects of local interest. It is not necessary to have the support of the school board, and not necessary to tell the pupils that their plans will be carried out. The completed plans will often lead to concrete results. And even tho they do not, two very definite results will have been accomplished: the boys will have had excellent training in technique, and their eyes will have been opened to civic problems about them, a fundamental step in training for citizenship.

# ENAMELS AND ENAMEL FINISHES

Ralph G. Waring

IN dealing with any finishing material it has been my experience that workmen handle the product more intelligently and with a better appreciation and understanding of its shortcomings and advantages, when they are given an opportunity to understand and study its composition. If they understand the compilation of a flat wall oil color for example, they have greater patience in breaking it up or boxing it and are more apt to do a better job of stirring with less tendency to compare it with the relative ease of breaking up lead in oil to the same consistency. In any flat wall color there is a very great difference in the amount of pigment as compared with the vehicle; a condition necessary in this class of paints.

The same holds true of enamels altho the proportion of vehicle and pigment is better balanced. At the same time, however, it has neither the body of a pure varnish nor the brushing qualities of a wall coating. Nor are enamels for furniture, machinery, or factory walls of the same composition. Each has been designed for its particular use by a competent manufacturer whose years of testing and compounding have taught his force that certain materials will react to meet certain conditions.

In selecting materials for furniture enamels, let us say, the technical superintendent and chief chemist of the factory have three groups of pigments or base materials from which to choose and which may be outlined as follows:

1. Basic white pigments:
   - (a) Zinc oxide.
   - (b) Lithopone.
   - (c) Leaded zincs.
   - (d) Sublimate and carbonates of lead.
   - (e) Tin oxide.
   - (f) Marbon white.

The first, and by far the most important, is used in such high grade enamels as Pratt & Lambert's Vitralite. It is chosen principally because of its extreme whiteness, fineness, and wonderful opacity or covering powers, as well as its avoidance of harmful reactions with other materials with which it may be combined to produce a finished enamel. Some lithopone enamels which I have analyzed and tested have shown a very marked tendency to turn pink but this was in part the result of other incorrectly chosen materials. The other basic whites are used in varying proportions by different manufacturers; while the last Marbon White, gives strong evidence of being the one really perfect pigment which has been produced either for enamels or paints.

The second group of *Basic Color Pigments* is composed of the seven primary colors together with an almost endless line of combinations on all colors.

The third group constitutes the so-called *Inert Pigments* which may be added as extenders but which, in furniture enamels at least, are decidedly harmful; since they are apt to cause fading in use with basic whites and most certainly decrease the opacity of an enamel of which they form a part. It is my experience, however, that they perform a very necessary part in mill wall enamels suitable for schoolhouse use; since the inert pigment is useful in leveling up the wall surface and permitting the finer pigments to work up toward the top of the enamel film. These inerts are chiefly derived from whiting, silica, china clay, asbestine, magnesium carbonate, etc. The only time when these materials would be tolerated as a legitimate part of the high grade furniture enamel would be that occasion where they acted as a carrier for precipitated colors, as for example in the manufacture of some lakes where the color is precipitated simultaneously from solutions on an inert base.

The most important vehicle in enamel is the varnish, for it is upon this material that the durability, the brushing quality, the rubbing and polishing quality and the entire life of the enamel depend. Such a varnish must not react with the pigments; must not "liver"

or thicken while grinding, it must not cause undue heating of the stones of the mill, it must hold that pigment in suspension as completely as possible and cause the pigment to settle as a heavy or hard cake in the can, it must be pale enough to avoid discoloring delicate tints. It must permit a reasonable brushing and flowing and above all else it must permit sanding, rubbing and polishing; for a perfect enamel finish consists of many coats, each leveled and prepared for the one to follow in order to effectively imitate that perfect finish, the enamel or glaze on porcelain or china.

In order that the enamel may dry properly, that is harden, it is necessary that "driers" be added. This material may of itself spoil all the foregoing and following results, if incorrectly selected. When white shades of enamel are used, the greatest care in selecting this drier is necessary to avoid "pinking" for which condition the drier is mainly responsible. Years of test have proved that the *drier* itself does not take any active part in the hardening of the film but that it merely acts as a catylitic agent, or middle-man, if I may so use the term, in conveying oxygen from the air to complete the saturation or hardening of the oils in the varnish. Where processed linseed or china wood oils are added to make the enamel flow better, the driers work on them as well as on the varnish oils.

Of late years new reducers have appeared, so that now enamels are being thinned more often with 42°-52° Be. napthas or petroleum products, since they perform merely a function of dilution of the enamel to the correct point for brushing. On evaporation the film begins to harden and perform its desired function. Turpentines, either gum or wood, have been much used for years but are too expensive and in the case of wood turpentine are apt to work injuriously on the enamel film. In practically all paint work the use of a high grade naptha or petroleum spirits is equally as effective as turpentine and far less expensive.

As the materials have advanced in the process of manufacture they are subjected to the most careful scrutiny and inspection, and the last but by far the most important operation of all consists in the grinding —either in a Usophus water cooled stone mill or in a steel roller mill. The first is used on high grade furniture and cabinet enamels, since it actually grinds the materials infintesimally fine but is too expensive and slow for the production of mill white enamels for which the four ton daily capacity in the steel roller mill is eminently suited.

Enamels constitute the most difficult finishing material for the beginner to learn to handle and brush properly. If he has been working with varnishes the difference in the setting qualities of the enamel will cause considerable anxiety. If he has worked with paints, the effort to avoid undue brushing is severe. Enamel work of high grade requires considerable work and more skill. To lay it in flat work and have it level out is not so hard but to apply it to standing work is something entirely different. Sags and laps are sure to occur during the first effort, but continued practice is the only answer to this problem.

It is absolutely essential that high grade brushes be used, and it is preferable that they be badger since they are the proper length and stiffness of bristle. Avoid a cheap badger brush that is loaded with stiffer, straw colored bristles in the center; open up your brush and determine that the same kind of bristles make up the whole tip. Keep all good brushes suspended up to the ferrule in clean varnish and turpentine; do not leave any bristles exposed. Work in a warm, clean room on clean work, with clean brushes, hands, and clothes. Dirty enamel is a tremendous job to sand off and prepare for recoating.

Of the many fads and fancies which have appeared in enamel furniture, none I think is more ridiculous nor less artistic than that which calls for an ivory enamel for instance and a heavy, deeper shade running around the panel lines and applied decorations. It is an attempt to imitate the accumulated dirt of time left by careless housekeepers. One often sees it on imitations of ancient sculpture, in plaster paris which has been treated with yellow wax and then wiped over with a darker glaze to imitate age. It was quite noticeable, however, that at the last furniture exhibit at Jamestown, N. Y., and Grand Rapids, Mich., that the fad has been of very short duration. Ivory, or other shades in enamel furniture, is often very handsome indeed when properly treated but let us not add insult to injury by attempting to imitate any unwholesome feature.

*Editors' Note*—A practical application of the principles and facts in this article will be found on Page 88 in the Questions and Answers column.

Dresses made by Girls in the High School Sewing Classes, Kenosha, Wis.

# INDUSTRIAL-ARTS MAGAZINE

**Board of Editors**

E. J. LAKE S. J. VAUGHN


## EDITORIAL

### SPEAKING OF JIGS.

THE jig as a school device is not new, despite the popular conception. It has been in use a long time, but most school people have never discovered the fact.

The old fashioned school with its lock step routine, its antiquated task for the task's sake, its distruction of individuality and its rigid insistence upon form was the very essence of jiggery, (to take liberties with a perfectly good word). The danger of the jig is that used to excess, it will take away the values of the individual task done in an individual manner, and substitute deadening routine for thoughtful effort.

The schools are filled even today with retarded children or repeaters and chronic failures because the schools insist upon *quantity production of standardized children.* The time is not long past when a child either with a special talent or with a lamentable impediment could find no place in the school because it could not fit into the mould, or could not be operated upon by the wholesale, jig process. Children were promoted by grades and marked by meaningless per cents. If a boy got 69½ per cent instead of 70 per cent in grammar, he thereby failed also in arithmetic, geography, and history and had to take them over—had to go thru the jig again. This was mental discipline, so he was comfortingly told. It was the "grindstone method" that sharpened his mind, so the jig operators said.

Yes, there were jigs in the olden days, and some of them remain to this day—and they are not in the shops either.

### ARE WE DOWNHEARTED? NO!

HAVE you many talented pupils in your class this year? You know my daughter is taking work with you! Does she show talent? . . . These questions have come to every teacher of art every year at about this season or even earlier, and they always leave a feeling of helpless responsibility.

A teacher of music of twenty years' experience confessed that, of the hundreds of pupils who had undergone his instruction, he could count on his fingers the ones who might have reached professional skill, and of those *he could count on one hand those who had!* We know that the little training our pupils get could never develop them to a professional standard, we know that the great majority are incapable of such development with any amount of training. *And yet we go on teaching art!* Why? Because we believe that the arts must be made to enrich every life to some degree.

But does our training enrich the life of every pupil? Is our teaching designed to enrich life? Are we holding this purpose in mind or are we carrying on our work in a routine way according to schedule, and thinking little of results?

Have we brought our instruction to bear on the exact performance of a few fixed exercises, or are we considering the pupils from day to day as individual human beings who have their own thoughts and ambitions and abilities? Yes, abilities; for each one of them must have some faculties that could be developed thru art. No subject in the school curriculum has such a variety of appeal as Art. It applies in a thousand ways to a thousand interests. It can be made interesting to pupils when all other agencies have failed.

A teacher in the poor district of one of our large cities tells of "a boy indifferent to school work, who became interested in lettering and learned to do it exceptionally well—in fact, he would do nothing else." Such cases are within the experience of most art teachers. They are the indicating straws. We shall carry on in spite of talent, or the lack of it.

### THE DEVELOPED PROGRAM.

IN past years it has been the common experience of program makers for teachers' organizations that a fine and often expensive program has seemed to fall flat thru lack of interest, or at best to offer but a passing diversion.

This has been especially true of the meetings of Industrial Art teachers. The general subject of Industrial Art is becoming clarified by that definition of purpose which teachers must continually employ to define their particular work. Understanding clearly what one is to accomplish is the first step toward the accomplishment, but it is only the *first step.* It is idle to confuse the purpose of vocational training with that of manual training and Art training. It is idle to assume that educational results may be secured by educational methods regardless of the content of a subject. Subject, content, and method must be carefully adapted to the objective of each class under instruction.

This necessity should be much in the minds of the program makers who would formulate a program worth while to an organization of teachers who have some common interests but whose interests are not altogether alike. It is evident that the program should contain general meetings to deal with those interests that are common to all teachers of a class of subjects, and should contain sectional meetings to deal with the particular interests of each class; but it is becoming more evident each year that the best results are obtained thru prepared discussion by many individual members.

Mere time on the program for discussion does not guarantee worth while discussion. The art of the debater who can and will talk indefinitely on any question at a moment's notice is "art for art's sake", and may be as wasteful of time on the program as the art of the orator who deals with glittering generalities. Every

meeting of an established organization should have some important questions under committees; yet the results of such assignments to committees is rarely productive, because they are dependent on the chairman, who may or may not be able to develop the subject thru committee.

There seems to be one direction in which our programs may be much improved, and that is in the way of the "developed program" which will afford opportunity to hear a variety of well-prepared discussions of a variety of topics that have been suggested thru the experience of the members of the organization. Such a program makes the Program Committee the most important committee of the organization. It necessitates the continuation of memberships on the program committee, and requires that the various interests of the organization be represented. It demands the attention of the program committee to the development of a program by assignment from year to year of particular topics suggested by the members to those who have particular experience with each topic.

The Program Committee must be continually on the job, and not leave the formulation of a program to the few weeks preceding a meeting by employing notable speakers on short notice.

## WHITTLING FIDDLERS, OR NERO'S MISTAKE.

Old blundering Nero fiddled away while his city burned. He lost his main chance to become modern by not getting a Swedish sloyd knife and whittling away his time.

We are reliably informed that there are manual training teachers in this twentieth century who are giving "lengthy, logical, and sequential courses" in whittling with a Swedish knife to seventh and eighth grade boys! What do they make? Marvelous projects such as plant sticks and nozzle holders—things that no boy ever made except in school! Nozzle holders! A case is reported where a class of twenty boys were required to make nozzle holders. Finally, on questioning, it was found that only one boy had access to a hose nozzle in his home. Then the ingenious teacher seriously suggested that they could tie the nozzle holders to the ends of the sticks with which their mothers prop up their clothes lines on wash day. This wonderfully convertible device would furnish a place in which the line could rest! The boys involuntarily exploded in derisive laughter. So, they are safe yet.

We have time and again paid our respects in these pages to the reactionary tendencies in manual training. We have urged and argued against such absurd practices as whittling, the making of disgusting, inconsequential, and useless objects, the use of abstract joints and exercises, the laying down of cut-and-dried courses based on an impossible "series of sequential tool processes", and ridiculous "canned" or stereotyped printed directions.

*Manual training is in for the fight of its life in the next few years,* and it is the prevalence of such antiquated stuff as this that is going to make the fight a losing one, unless these manual training teachers wake up and catch step with the modern trend of things. All the subjects in the curriculum are now facing the most searching inquiries. Each subject must stand up and be counted and give cause why it should remain in the course. Manual training must do likewise. It is again placed on the defensive *and it has been placed there by those who persist in this impossible type of deadening, unfunctioning routine.*

Every investigator and every student who has caught the spirit of the modern progress agree that such work as indicated above does not function in a social way and does not even accomplish at all what is claimed for it by its advocates in the way of influence on the individual. May we repeat that any work, such as whittling or abstract exercises in the grades, is not only valueless but is extremely harmful. It is worse than nothing. Whittling is a loafer's job. Whittling with a Swedish sloyd knife is unspeakable. It is as much out of step with modern thought as the use of Indian stone axes or the throwing of the javelin. A Swedish sloyd knife can scarcely be bought in any hardware store in the land.

The only way to reinforce our manual training work so that it will stand the test when the test comes is immediately to discard the antiquated exercises and models along with the antiquated theories and dogmas and to swing right into line with the forward marching trend of thought and events. In order for this to be accomplished, it is most necessary that all who have any following, teachers, authors, book makers, publicists, and lecturers shall unite in a general house-cleaning, or general fatigue day as it would be called in the army, to get ready for the thoro-going inspection that is inevitably on its way.

## WHAT DO YOU MEAN, ART?

In reviewing a collection of French war posters recently, a writer of some accomplishment referred to the French poster as "too artistic for the best results." We surmise that what he meant by the statement was that the French poster was pictorial and detailed beyond the purpose of a poster. Without debating this opinion we conclude that he did not say what he meant and that he did not say what he meant because of his ignorance of the word Art.

Art is above all things, purposeful. How can a work of art be too artistic to be effective when it cannot be artistic unless it is effective? As to the distinction between the fine arts and the industrial arts, there is general misconception. This misconception would pronounce use and beauty at variance, if not in opposition. Fine production of the human mind can never be useless. Beauty is always useful. We can no more dispense with the gratification of one sense than another. Art in its various forms gratifies each of our senses, and is essential to life that is worth living.

FIG. 2. THE CLEANING GANG AT WORK.

# EIGHT THOUSAND SCHOOL DESKS REFINISHED IN THE SCHOOLS OF KANSAS CITY, MISSOURI

Myron G. Burton, Director of Vocational Education

No portion of school furniture serves as a greater catch-all for dirt and disease germs than the school desk. The frequent scrubbings necessary to keep school desks in a sanitary condition, remove the varnish and leave them with anything but an attractive appearance. If schoolrooms are to be kept in neat and tidy condition, it is imperative that the desks be refinished every few years. The old process of removing the varnish, stain and ink spots with a steel scraper is so tedious and unsatisfactory that the job is frequently postponed as long as possible.

Notwithstanding the work involved, the Kansas City Board of Education called upon Mr. J. H. Brady, chief engineer and superintendent of buildings and repairs, to undertake the colossal task of cleaning and refinishing 8,000 desks during last summer's vacation. As it is the policy of the Kansas City system to give the trade school students an opportunity to derive the fullest educational advantages of such work, Mr. Brady called the vocational department into cooperation in the task. One of the paint classes, consisting of about ten boys from the Lathrop Trade School, was assigned to the work. These boys were employed at a rate of from fifteen cents to thirty cents per hour, depending upon their individual ability. The pay of each boy was raised as rapidly as his application and experience proved to increase his usefulness. An instructor from the vocational faculty was made foreman over the work, and whenever topics of special interest arose, students were called to order and the points were fully discussed. By carrying on the educational work in this way, the interest of the boys was kept at the highest point, and they were thus given sufficient time for tired muscles to relax.

FIG. 1. CLASS GETTING OUT DESKS.

The seats were loosened from the floor and were handed thru an open window to the yard. (Figure 1). A large galvanized tank about 3½′ by 5′ by 3′ deep was provided and fitted with gas burners to keep the cleaning solution hot. This tank was large enough to allow two desks to be completely immersed at one time. As one desk was removed, another was added, so there was no interruption in the work. It required about two minutes for the hot solution to accomplish its work, and soften all of the varnish, paint, shellac or other coats on the desk. The desk was then removed and placed in the washing stand where it was completely washed with the garden hose. A stiff scrub brush rubbed briskly over each surface removed any old finish material which failed to work away. (Figure 2). This process presented many advantages. While it cleaned the desk thoroly, leaving the bare wood in practically the same condition as when new, it also destroyed all germs and removed dirt, which might otherwise have hidden in the many corners and crevices of a school desk. Figure 3 shows the appearance of a desk before treatment, and Figure 4 the same desk after being cleaned.

The work was so organized as to make good teamwork possible, and each boy became an expert at his particular task. After the bath, the desks were allowed to dry in the open air for a few minutes. It was a complete surprise to everybody to find that the grain of the wood was not unduly raised, glued joints were not disturbed, the wood was well bleached, and the desks were thus in perfect condition for refinishing. All desks were returned to their respective rooms and reset and allowed to become thoroly dry before the refinishing was begun. Figure 5 shows a room filled with the clean desks, awaiting further treatment. The next step was a coat of stain

or shellac as the color scheme of the room required. Two coats of varnish completed the job.

The estimate and allowance of the board of education for this work was 70 cents per desk. But after the 8,200 had been satisfactorily completed and reset ready for use, and all items of expense were considered, including the removal of the seats from the room, resetting and payment for all operations and all materials, the average expense was 50 cents per desk.

The unusually satisfactory results arising from this piece of work are due to the hearty cooperation between the engineering department and the department of vocational education. The Lathrop Trade School boys who took part in this work, were kept employed under their regular trade school instruction, and also had the benefit of the foremanship of experts from the engineering department. The work was placed on a strictly productive basis and was measured by commercial standards. The students were able to earn as much, or more, than they could have earned in any other line of work which they might have undertaken.

This same plan of cooperation, giving the trade school students an opportunity to come in contact with the practical problems of the engineering and repair department, is also being carried on in many other lines of work in the Kansas City schools. Carpentry classes are putting up buildings which are wired by the class in electricity, plumbed by the plumbing classes, painted and decorated by the painters. Every trade taught in the Lathrop Trade School has a field of operation in connection with and under the trade supervision of the engineering department, carried on simultaneously with the regular instruction under the vocational department.

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*Muskegon, Mich.* The Hackley Manual Training School is offering three types of work this year. Two new courses in industrial arts and home economics have been provided, in addition to the regular short commercial course which has been conducted for a number of years.

*Bucyrus, O.* Vocational work for the upper grades has been discontinued as a part of the regular course of study. Evening classes are to be conducted for the benefit of those who desire vocational instruction.

FIG. 5. THE CLASSROOM AFTER THE CLEANING HAD BEEN COMPLETED.

*Sheboygan, Wis.* Classes in fiber chair seating and upholstering have been introduced at the vocational school. Classes for printers and shop apprentices have also been formed for those desiring to learn a trade.

*Tulsa, Okla.* Courses in motor repairing, carpentry and printing have been added at Central High School to meet the demands for training in these lines.

*Agricultural and Mechanical College,* Grubbs Vocational College and Tarleton College in Texas are offering vocational courses for disabled soldiers. Two hundred have been assigned to A. and M. College, while smaller groups will study at the two other institutions.

*Fifteen hundred disabled soldiers* have entered upon vocational training in the educational institutions of Texas, according to a recent report of the vocational officer in charge of the district office. Men suffering with major handicaps are given preference in assignment to the several institutions.

*Courses in electricity* for boys and home nursing for girls have been inaugurated at the vocational school, Marinette, Wis.

FIG. 3. BEFORE CLEANING.

FIG. 4. AFTER CLEANING.

# The Manual Training Conference at Cincinnati

*A three day conference* closed its sessions at the University of Cincinnati December 6. It was the tenth annual meeting of the Manual Arts Conference called by the United States Commissioner of Education and presided over by Dr. W. T. Bawden of the Bureau of Education. A more strenuous conference could scarcely be imagined than this annual affair, where from twenty to forty men remain in almost continuous association for three days and two nights even carrying their program almost uninterruptedly thru the meal hours. The 1919 Conference was attended by forty-two men.

From many points of view, this meeting was more successful than any that have preceded it. The attendance was larger, and the membership more varied, than at any of the previous meetings, altho the original group of men who conceived the idea, organized the Conference, and determined its character and purpose were faithfully there. It would seem a strange and lonesome Conference, indeed, on the subject of the Manual Arts, if the familiar figures of Prof. C. A. Bennett, Dr. W. T. Bawden, Mr. I. S. Griffith, Mr. C. S. Van Deusen, Mr. R. W. Selvidge, and Mr. Wm. E. Roberts were not present to welcome the newcomers.

The striking feature, and indeed the surprise, of the program was the predominance of discussions on topics related to foreman training, Smith-Hughes classes, teacher training for vocational subjects, industrial relations, employment management, etc., etc., in a Manual Arts Conference.

The first half-day of the Conference was taken up with the presentation and discussion of a report by Mr. Charles R. Allen, agent for industrial education, Federal Board for Vocational Education, Washington, D. C. This report concerned an experiment in developing a course in foreman training and for which permission was given to use two large industrial plants as laboratories in doing foremen extension training. Mr. Allen brought out the point that since three-fourths of the working men are in unskilled trades, too much attention, comparatively, has been given to training in skilled trades. The experiment revealed the following facts:

1. The human element is the big cost factor in industry.
2. Foremen meetings and efficiency courses make but few noticeable improvements in the matter of foremen training.
3. Skilled foremen cannot do the foremen training; skilled teachers without the technical knowledge and experience cannot do it; the employment management cannot do it; but the combination of the three factors, employment management, production, and teaching must constitute the team for this work.
4. The instruction should be given with small, mixed groups.

Progress in the development of plans for preparing teachers of industrial subjects was reported upon by Mr. D. J. MacDonald of the University of Cincinnati; Mr. F. D. Crawshaw of the University of Wisconsin; and Mr. James McKinney of the University of Illinois. Mr. MacDonald gave a somewhat detailed description of the actual work as it is carried on in the University of Cincinnati on the co-operative plan. Mr. Crawshaw told of the advanced step taken by the University of Wisconsin in the matter of credits for manual and vocational subjects, the elimination of the foreign language requirements for entrance and graduation, etc. Mr. McKinney brought a most interesting story of his efforts in teacher training in the city of Chicago, and emphasized the advisability in giving method courses of avoiding the discussions that turn on technical trade procedure upon which tradesmen could never agree. Mr. Griffith pointed out in the discussion some interesting conclusions concerning the teaching of related subjects.

The first evening session was devoted to a consideration of the plan worked out by Mr. C. S. Van Deusen of the State Normal College, Kent, O., for itinerant practice teaching of special subjects in rural and village schools. This developed great interest and much discussion.

Mr. R. W. Selvidge of the University of Missouri explained the plan whereby the army proposes to carry on vocational training for the enlisted men. According to his report, the various army camps are to develop ample facilities for vocational work, each emphasizing some special line or lines not emphasized by the others. It seems that the demand is very urgent for high grade tradesmen and trade instructors for this army work. At this point, Lt.-Col. Maddox of the U. S. Public Health Service, described the plans now being made for educational therapy in the permanent hospitals for soldiers and marines, and asked for help in securing the proper kind and number of young men trained for such service. Questions and suggestions were called for and Mr. S. J. Vaughn took occasion to point out some things to avoid, basing his suggestions upon his own experience with the departmental red tape, inefficiency, and petty annoyances that interfered with the educational work in the hospitals during the war.

In a progress report of the Committee on Examination and Certification of Teachers, Mr. Arthur B. Mays of the Sam Houston Normal Institute, Huntsville, Texas, proposed several strong recommendations concerning proper preparation of teachers for manual arts work. The report argued for greater recognition by schools of technical and professional courses in the granting of credits for degrees; for the requirement of college graduation for high school manual training teachers, and for a minimum requirement of two years above a four-year high school course for certification to teach.

Mr. A. F. Siepert of Bradley Institute, and Mr. Fred C. Whitcomb of Miami University, Oxford, O., presented the report of the Committee on Practice Teaching. Stress was laid upon the need for a proper lesson plan, daily preparation, close supervision, and the desirability of actual school conditions in which to carry out teaching plans. Some very interesting discussions arose over the different plans for practice teaching. Mr. E. L. Usry of the Ohio State University contributed an interesting item to the Conference in describing the scheme by which for several years he has sent his students into the surrounding communities to teach manual training in their schools and by which the students receive some compensation.

The last topic of the Conference was the training of teachers of vocational and industrial work not now federally aided. This subject was handled in a most helpful way by Mr. Clyde A. Bowman of Stout Institute. Mr. Bowman presented by means of charts the results of certain investigations carried on by himself and some students in Teachers College. These investigations undertook to determine the needs in the various lines of industry in New York City for workers of various sorts. Put into graphic form the data obtained is made available for the guidance of those who are looking forward to trade employment.

The Conference was so much impressed with the charts and the conclusions that the members began to urge their publication. At this point, S. J. Vaughn of the Industrial-Arts Magazine proposed to publish the material and to furnish reprints of it for the use of the members of the Conference, if they so desired and if it were satisfactory to the Bureau of Education. If satisfactory arrangements can be made, the material will appear in the next issue of the Industrial-Arts Magazine.

One feature of the program which did not appear in the printed matter was the opportunity to see several reels of excellent pictures on the war, on irrigation in the west, and on the starting system of an automobile. The Conference was indebted for this feature to Dr. W. T. Baw-

den, who brought the films with him from Washington.

Minnesota University, Indiana University, Missouri University, Illinois University, and Bradley Institute invited the Conference for next year. After the usual "reasons why" from each contender, the Conference selected Bradley Institute, Peoria, Illinois, for its next meeting place.

### THING-MINDED BOYS AND SCHOOL WORK.

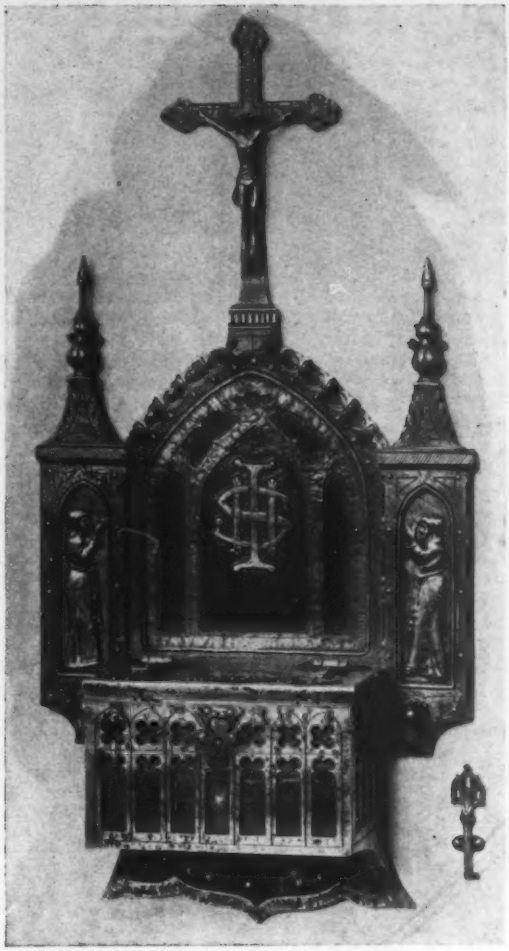
**Edward C. Emerson, Boston, Mass.**

In the excellent article in a recent issue of the Industrial-Arts Magazine on "Class Management" by Mr. Vaughn appears this statement: "Finally the superintendent decided that the boy might spend half of each day in the shop and the other half in his eighth-grade work. He finished all the eighth grade work with a much higher record than he had ever made before, altho he devoted half his time to shopwork."

Here is text for a mighty good educational sermon, if only our rather academic educators would listen to it. Half his time was spent in the shop, only half in the classroom work, and yet he excelled in the latter as he had never done before. It might, it is true, have been an accident. Very likely, the boy under discussion suddenly found himself and struck his stride, with shopwork to give him the necessary boost over the stile. Many years' experience in academic and shopwork teaching and supervision have convinced me that not only a boy here and there would benefit by a large amount of manual work, but it is a rare boy indeed who would not be better in his books if he were to spend at least two hours daily in some sort of shop where he recognizes the work as worth while, and in an activity which will lead itself to better understanding of classroom instruction. The trouble with manual training is not that we give it too much time, but that we give much too little time to its activities.

We have in Boston schools for the academically retarded and particularly "thing-minded" boys (not mentally deficients), classes which we call, for want of a better term, "Prevocational." They are organized on the basis of a six-hour day, four for academic work, and two for shopwork. The majority of boys who enter these classes become quickened academically to a considerable extent. They can do what the other boys are doing, and more. They become alert, acquire initiative, the power to think and do. The academic work is tied closely with the shop, and there is frequent and friendly intercourse between the shop and academic teachers. The boy thru his shopwork is led to see the reason *why* he must learn to add, to subtract, to divide, to multiply correctly and swiftly. He sees *why* he must gain knowledge and how the knowledge he is gaining in the classroom helps him in the shop. English puts on a new suit for him when he finds he must use it in describing what he has done, or in helping a new boy over a hard place, or in writing letters for desired catalogs, for goods needed, etc. Geography and history, tied up with his shop materials and products, become of real and vital interest, and are remembered. And there is the fascinating subject of hygiene of the shop, the home, and the school lunch; the physics of belts, pulleys, cutting speeds and inclined planes; the chemistry of glue, paints, oils and varnishes, and so on for lesson after lesson and day after day, each bringing new features and new points of view which stimulate the imagination and aid spiritual as well as mental growth.

What is good for a boy of this type is, in my opinion, equally good for the boy whom we are in the habit of calling "normal" (altho I object to the inference that the other boy is not normal). Be the term as it may, the fact remains that a boy benefit by the sort of instruction and relation of subjects I have indicated in direct proportion to his abilities and interests. In the early days of prevocational work in Boston we had classes of thirty, in two divisions, and each division had nearly a half of each day in the shop. Some divisions were made up of "normal" boys. Did they lose? Not by any means. Whole classes, not individual boys as related by Mr. Vaughn, finished the work of their grades as well as, or better than they ever did before, in addition to having nearly one-half time in the shops.



ALMS BOX IN CHURCH AT PONTIAC, ILL.
Designed and Forged by Mr. Thomas F. Googerty.

Unfortunately, however, the question of cost came in. We were obliged to enlarge our classes to 45, to provide three sections, and extend the day to six hours to cover the shop periods for three divisions a day. The lack of sufficient funds also made it necessary to limit the instruction to those boys who would be most benefited by it.

I believe the time will come, however, when we will recognize the need of related motor activities. We have started in some of the primary grades the introduction of play periods, which have met with very remarkable success,—so I live in hopes that the day will sometime dawn when manual training will come into its own; and then I sometimes wonder if those "extravagant cultural claims" that were made for the manual work in the early days may prove not to be extravagant at all.

### AMERICA'S NEED IN THE INDUSTRIAL ARTS.

**This country, if it would compete with the countries of Europe in this great field, must develop schools and museums of Industrial Art throughout the country—must enact legislation providing for Government backing of great schools and workshops in this country where may be raised successive generations of artists and craftsmen, from whose ranks the great industries can regularly draw the highest order of industrial worker—the skilled craftsman, the designer who is both practical and artistic—the Industrial Artist.— *Arts & Decoration.***

# PROBLEMS AND PROJECTS

*The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.*

*Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.*

*Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.*

## THE AIRPLANE.

**Emerson Wm. Manzer, South Milwaukee High School.**

Here is a real live project for the eighth graders. I have found it to have all the requirements for a good up-to-the-minute problem. One of the best things about this project is that scrap wood will serve for it.

*Body*—The body is made from a piece of stock $\frac{3}{8}$"x2$\frac{3}{8}$"x 12$\frac{1}{4}$" planed and sawed to the given dimensions.

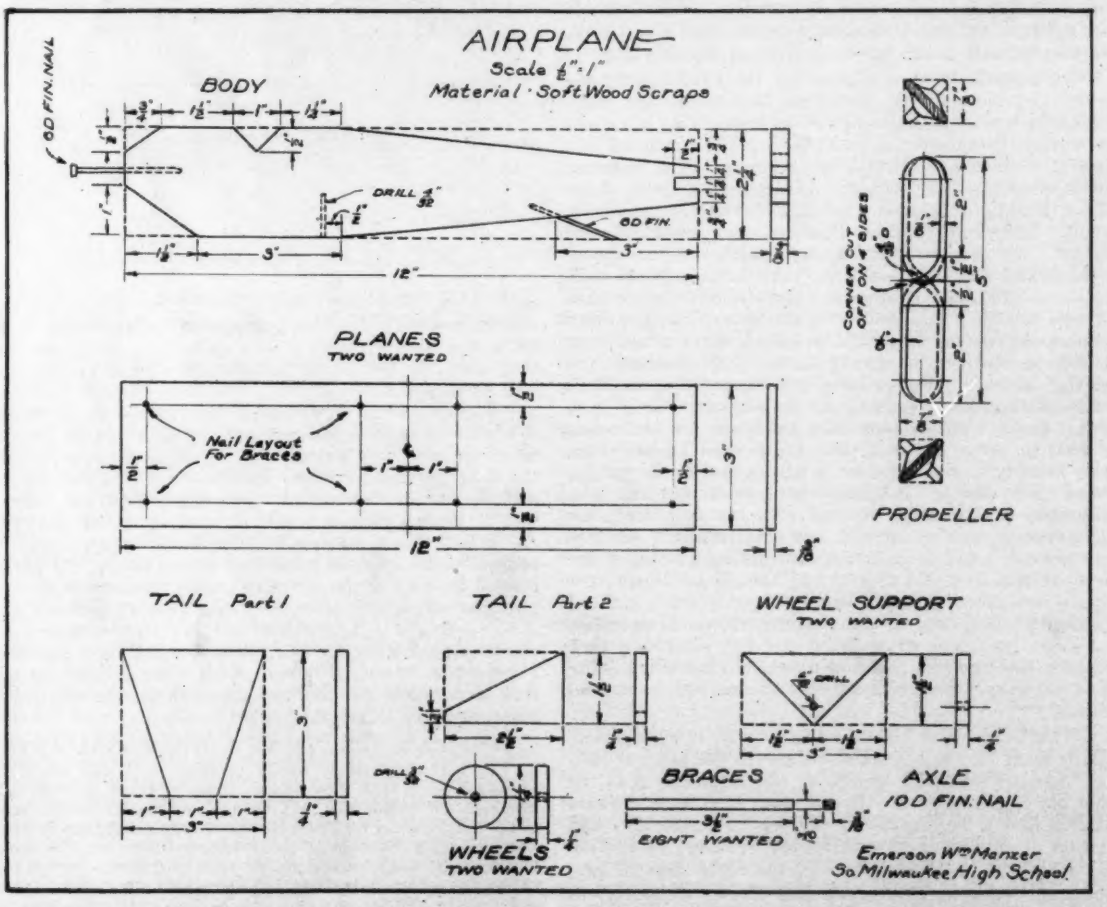
The 6D nail on the nose is used for the propeller shaft; the 6D nail at the rear of the body is used for the drag stick.

*Planes*—A piece of stock $\frac{1}{16}$"x3$\frac{1}{2}$"x12$\frac{1}{4}$" makes a wing on the plane. It is planed and sawed to size. One inch finishing nails are used to fasten the planes to the braces.

*Tail*—Two parts make up the tail. Part 2 is nailed to part one with a $\frac{1}{2}$" brad and a 1" finishing nail. They are so nailed that part one fits into the slot cut in the tail of the body. It is fastened to the body by $\frac{1}{2}$" brads after it is painted. This is done so that the tail and body may easily be painted two colors.

*Wheel Supports*—Pieces $\frac{1}{4}$"x1$\frac{3}{4}$"x3$\frac{1}{4}$" are made to size and the layout put on. Measure $\frac{3}{8}$" down from apex of

THE CLASS WITH THE PLANES.




DETAILS OF TOY AIRPLANE.

triangle for center of 4-32″ hole. This hole must be large enough for a 10D finishing nail which serves as the axle. Drill holes and then saw and plane to dimension. Fasten 1″ brads to planes, after planes have been assembled with cold glue.

*Wheels*—A piece of stock may be turned to size and a $\frac{1}{8}$″ hole drilled in it. Wheels are fastened to axle with cold glue. After they are painted, axle is ground off to length after supports are nailed on to plane.

*Braces*—Eight braces are used $\frac{1}{8}$″ square and $3\frac{1}{2}$″ long.

*Propeller*—The propeller is cut out with a knife. A piece of soft wood $\frac{1}{8}$″x$\frac{1}{4}$″x5″ is used. A careful demonstration is necessary before taking up the step. The hole should be drilled in the propeller before it is shaped. After it is painted it may be attached to the nose of the plane with a 6D finishing nail.

*Finish*—Paint is the best finish because of the brightness of color, and because of weather if the plane is used out doors. Let the pupil choose his color scheme from the variety of paints you will have on hand for him.

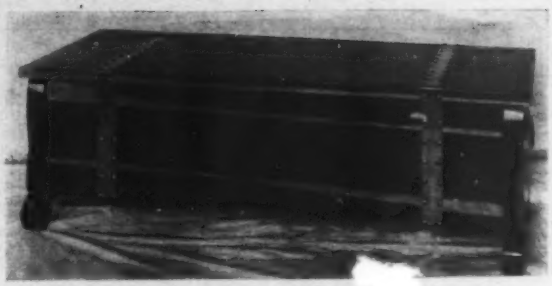
## COLONIAL CEDAR CHEST.

**H. P. Gerber, Northern Normal and Industrial School, Aberdeen, South Dakota.**

Here is a cedar chest that is easily made and is a stock saver. The bottom is made from western red cedar which is not only cheaper than the Tennessee variety, but is usually free from knots and works as easily as white pine. It has the cedar odor but is soft and lacks figure, so it cannot be used for exposed portions.

The front trim at each end is made from the remnants left after sawing out the base pieces, and these are fastened to the front with glue and a few finishing nails.

The section at the top view of the drawing shows that the front trim will cover the housed joint used at the corner. The front and back are glued and nailed to the ends.



COLONIAL CEDAR CHEST.

The legs or base pieces are made by gluing up two one-inch pieces and are subsequently fastened to the chest by means of screws. Two metal lid supports are used to hold the top up when open.

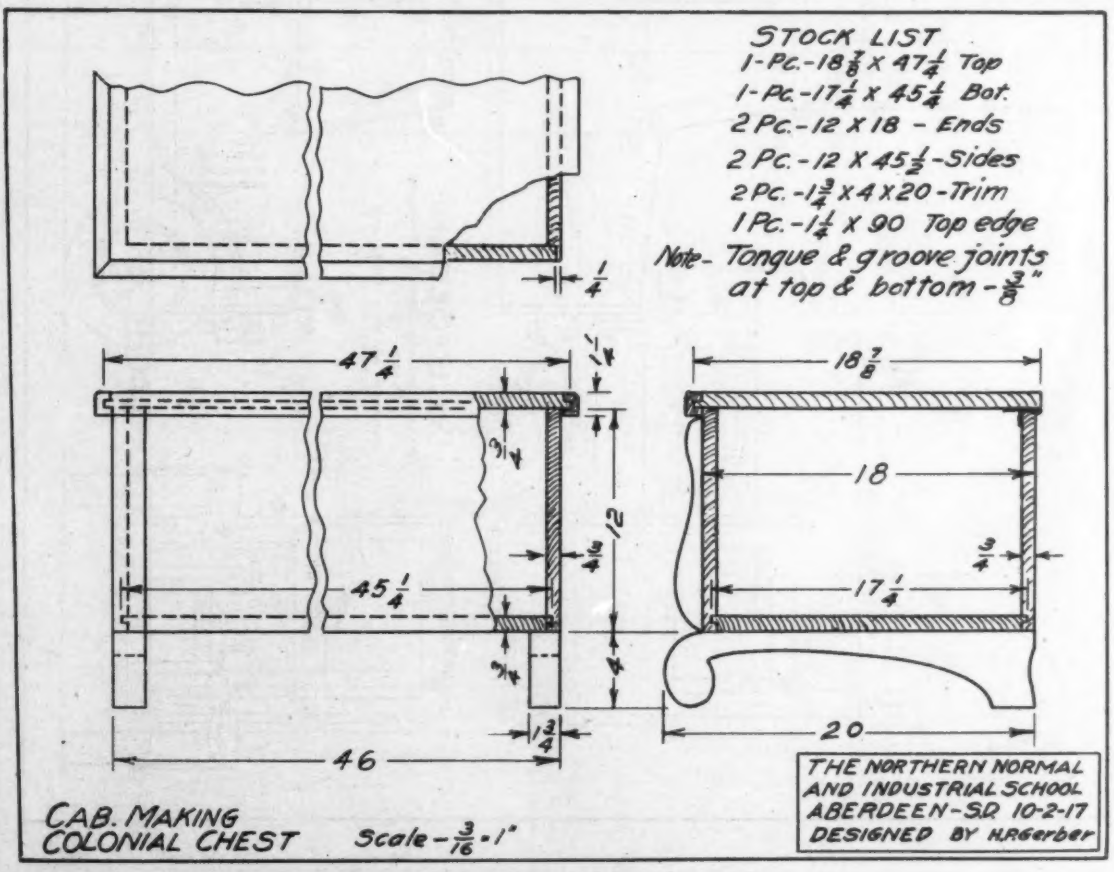
We always give these chests a coat of hot linseed oil and turpentine. Then follow with about three to four coats of rubbing varnish, sanding lightly between coats and rubbing the final coat with pumice and water.

The metal trim may be omitted.

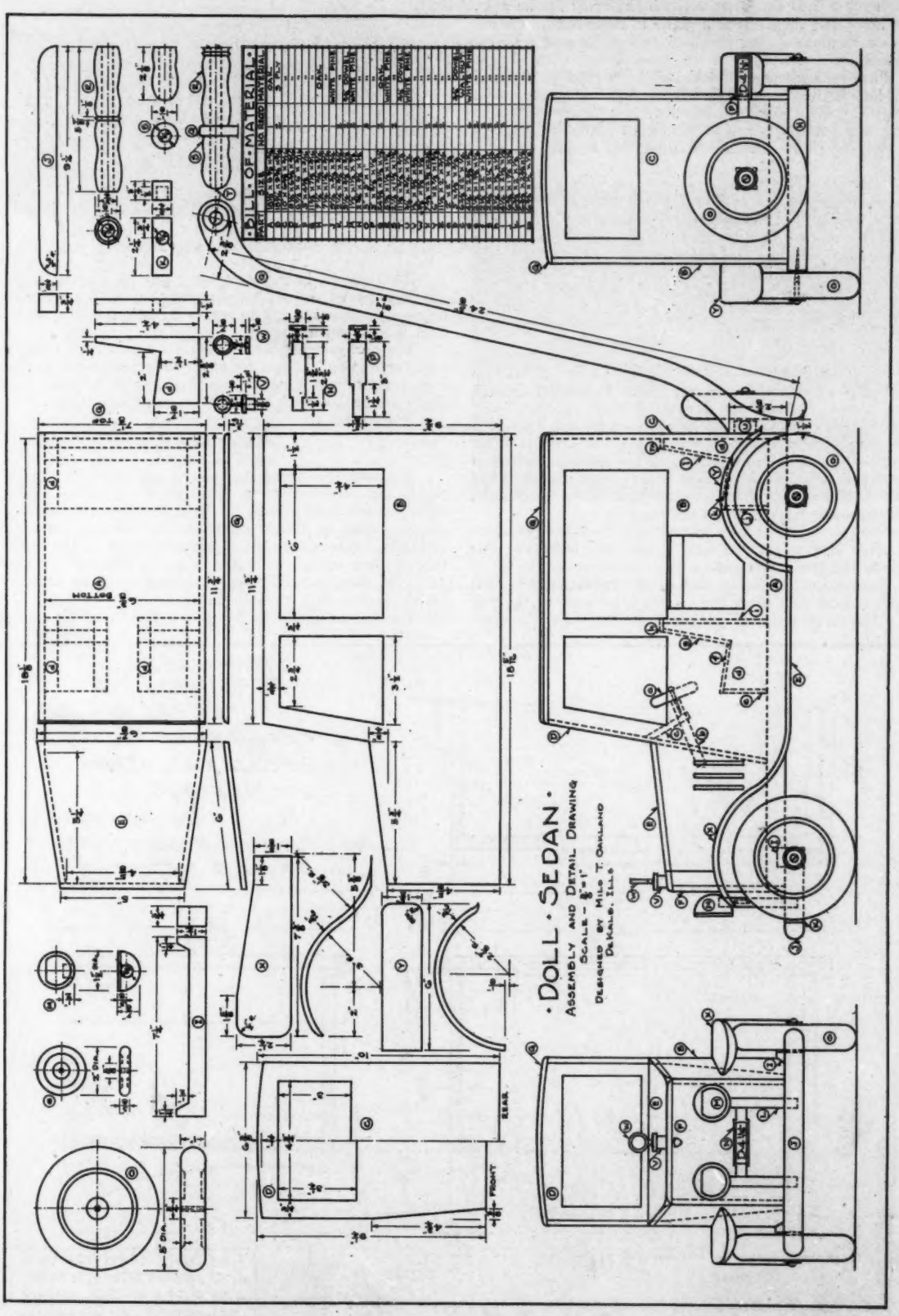
## DOLL SEDAN.

**Milo T. Oakland.**

To meet the demand of an up-to-date child, the Doll Sedan has been designed. This Sedan is not as hard to make as one might imagine from first glance and could be completed by an eighth-grade boy, with a little help at times. Where there is a younger sister in the family, this problem works out nicely as a Christmas gift. There may be many variations in design and construction, which makes this project immensely interesting. The photograph shows the Sedan with a fixed rear glass panel




DETAILS OF CEDAR CHEST.




DETAILS OF DOLL SEDAN.

and a movable windshield. Such details have been omitted from the working drawing and when desired, can be left to the ingenuity of the boy making the project. Three-ply material can be used successfully, but if this material is not at hand, other thin, soft wood can be used. The making and fitting of the fenders is perhaps the hardest part of the Sedan. The fenders shown in the photograph were sawed out on the band saw from white pine material and then glued and nailed to the body. Fenders could also be made from sheet metal or even thin wood, steamed and shaped. The wheels, steering wheels and lamps offer simple problems in face-plate turning and with white pine material, work up easily. Details such as upholstery, instrument-board, motor-meter and number plates add much to the project, and with careful painting, an attractive Doll Sedan is obtained.

## A BOOKBINDING PRESS.

**E. C. Rose, Supervisor, Dover, Ohio.**

The bookbinding press, illustrated in the accompanying drawing, will fulfill the requirements of the average teacher of elementary industrial arts. It is inexpensive to make and gives excellent service for elementary bookbinding and similar work.

The press illustrated was made from parts of wood handscrews which had served their time in the cabinet-making department. The stationary and movable plates were made from birch wood and the entire piece stained a dark color and given one or two coats of shellac followed by a coat of varnish. Iron vise-screws about 1" in diameter may be substituted for the wood screws.

Since it is not required that the screws be made in the shop, the problem is not beyond the ability of the average eighth-grade pupil.

## MACHINIST'S PARALLEL CLAMPS.

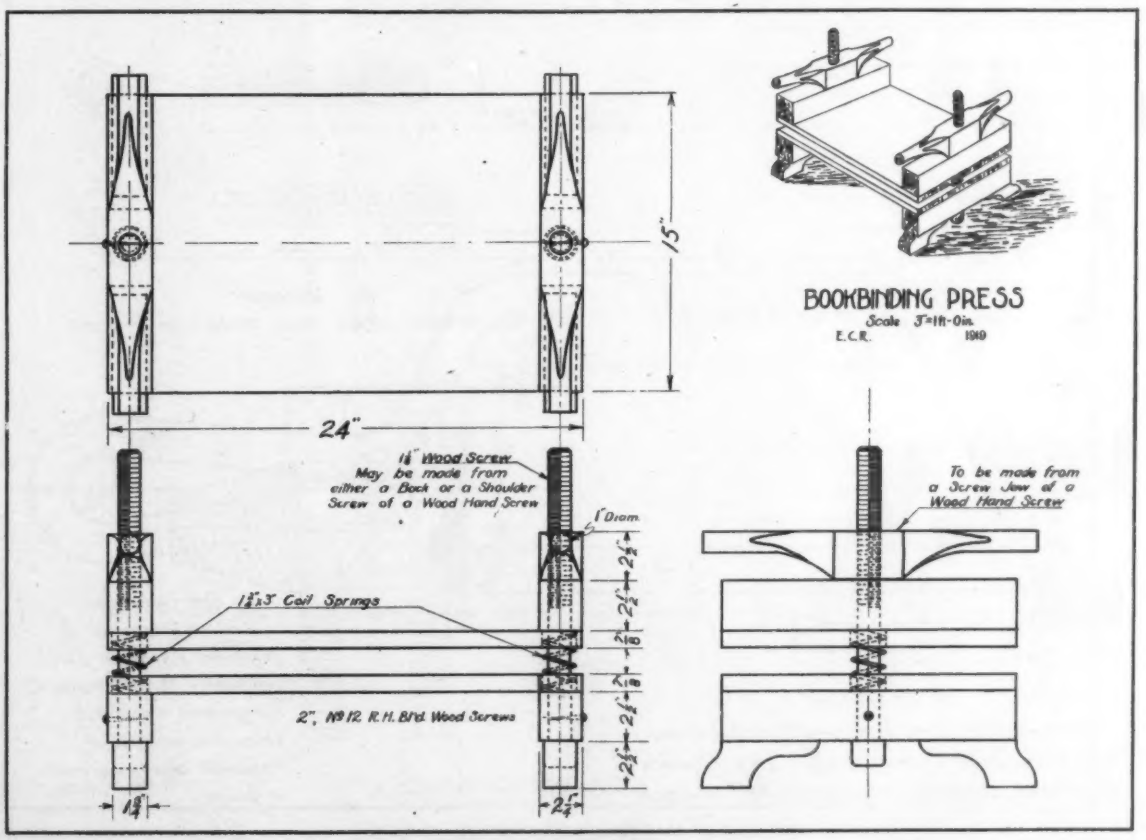
**J. G. Childs, Sheboygan, Wis.**

This machinist's parallel clamp has been found a good project for beginners in machine shop work.

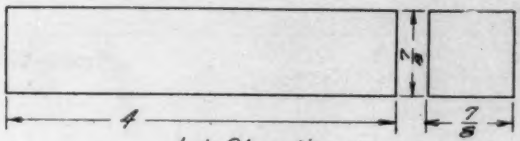
THE DOLL SEDAN.

This problem combines a variety of the elementary machine shop operations—planing, accurate drilling, tapping, turning and threading. Very little and inexpensive material is used thus reducing loss from spoiled work to a minimum. The project is worth while when completed and supplies an interest which is absent in exercise work.

The work may be given as an individual problem where each pupil is required to make a complete clamp or as a group problem wherein a number of clamps are made, each pupil completing but one operation.

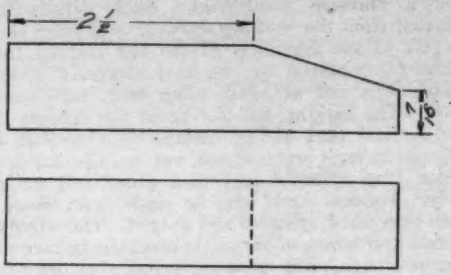

15"
24"
1" Wood Screw
May be made from either a Back or a Shoulder Screw of a Wood Hand Screw
1" Diam.
1½"x3" Coil Springs
2", No 12. R.H. Bd. Wood Screws
1¾"
2¼"
BOOKBINDING PRESS
Scale 3"=1ft-0in.
E.C.R. 1919
To be made from a Screw Jaw of a Wood Hand Screw

DETAILS OF BOOKBINDING PRESS.



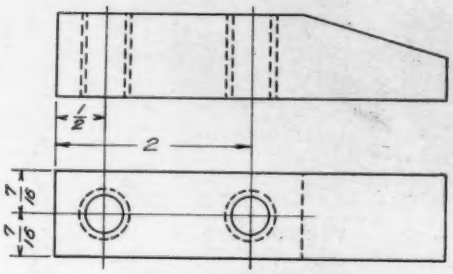

1st Operation.

Cut off stock from 1" sq. mild steel bar. Plane sides parallel, square and to dimensions. Make 2



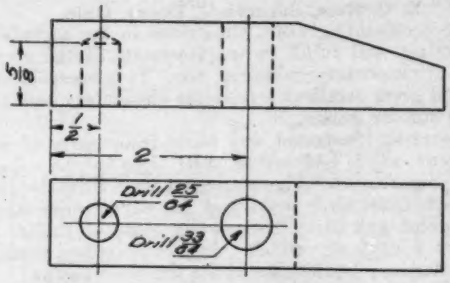

2nd Operation.

Layout and plane bevel ends Make 2



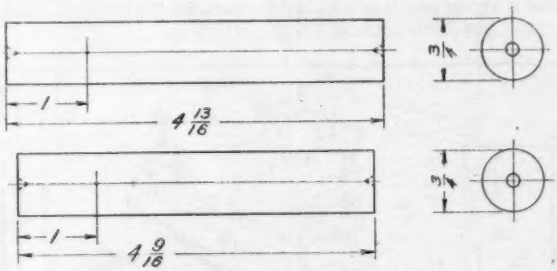

3rd Operation.

Layout location of holes, scribe circles, mark with witness marks. Drill holes 13/32, draw to center if necessary. Tap 1/2 U.S.S. Make 1.



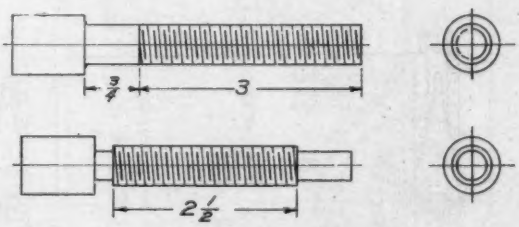

4th Operation.

Layout location of holes, scribe circles and witness. Drill holes, draw to center if necessary. Make 1.



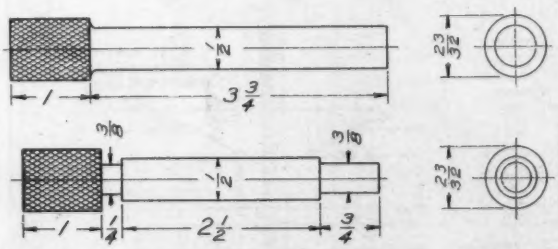

5th Operation

Cut off stock from 3/4" round mild steel bar Layout and drill centers Measure and mark length of heads Make 1 of each



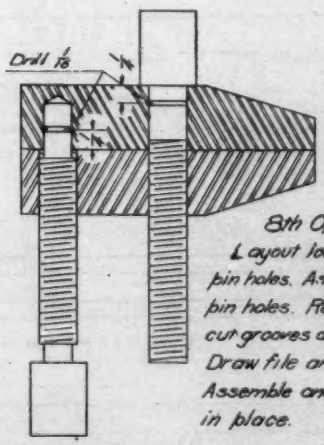

7th Operation

Cut threads, 13 per inch Make one of each.




6th Operation

Face ends. Turn 1/2" sizes to head marks. Mark shoulders and turn 3/8" sizes Reverse in lathe, turn and knurl heads. Make 1 of each




8th Operation

Layout location of 1/8" pin holes. Assemble. Drill pin holes. Remove screws, cut grooves at drill cuts Draw file and polish. Assemble and pin screws in place.

DETAILS OF MACHINISTS' PARALLEL CLAMPS.

The method of presentation is an adaption of the job analysis idea. Prints are supplied for each operation and the pupil works from that without reference to previous or subsequent operations. Dimensions and conventions need not be repeated on drawings as the stock is finished to the dimensions of the previous operation before work is begun. This method has the advantage of definite directions for the work at hand and focuses attention on a single operation.

## A HACK SAW FRAME.

**By De Witt Hunt, Director of Shop Practice, Oklahoma A. & M. College.**

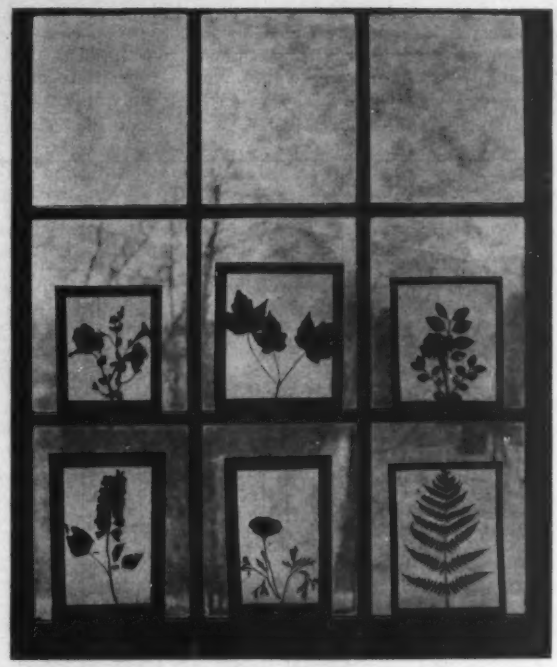
The requirements of the Smith-Hughes Act necessitate productive work on useful models. This means that there must be many new problems introduced into both woodwork and forging. The Hack Saw frame if used in classwork as a problem in quantity production, by means of stakes around which to bend it to shape, will make a very good practice problem, besides making a product which will be useful. The idea of its use came from the fact that Mr. M. E. Franklin bought a set of Auto Repair Tools and this saw was in the set. At my request Mr. Franklin prepared the drawing.

## TRANSPARENCIES.

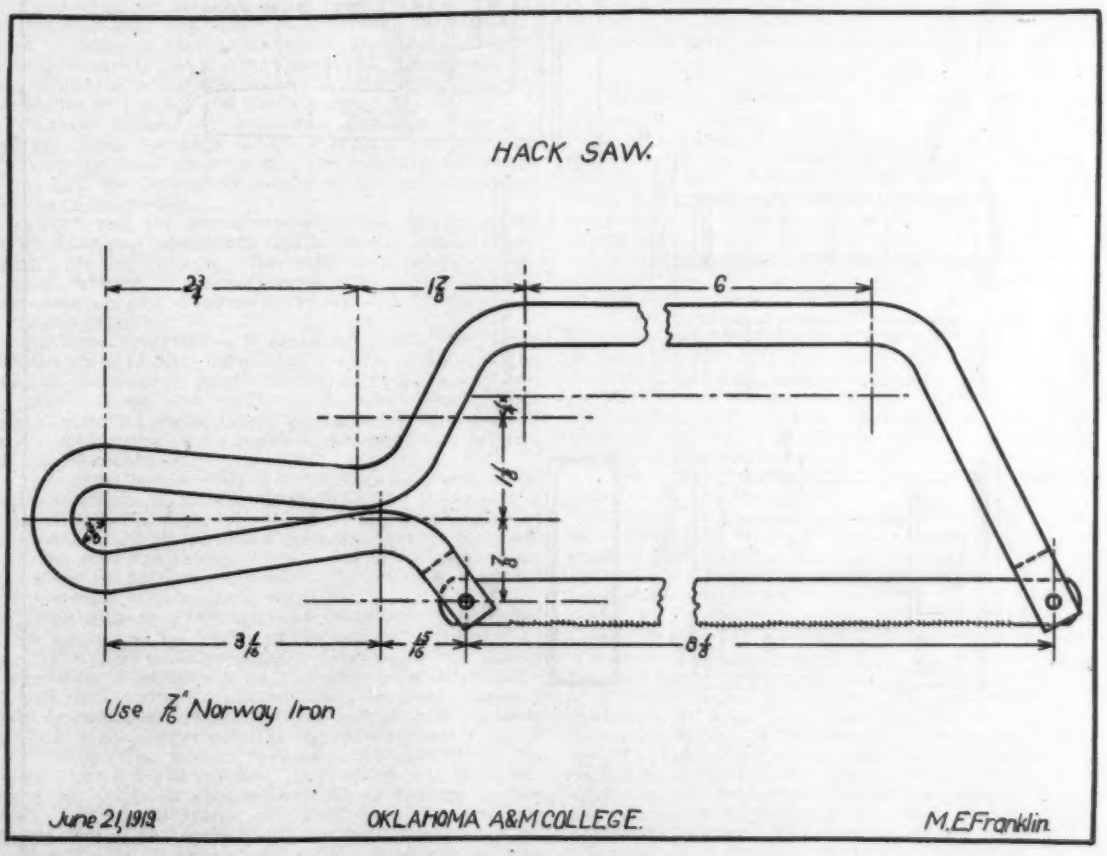
**Grace W. Engels, Newark, N. J.**

A much more interesting and practical way of teaching composition than by means of drawing is the making of transparencies for the window. Besides being very decorative for the classroom they furnish excellent material for design in the winter when nature material is not so plentiful.

The children are encouraged to collect flowers, ferns, leaves, berries, etc., that they may find and these are pressed until the time comes for the actual "making of the picture." Then care is taken to arrange the spray or group of material, as the case may be, so that the composition will be well-balanced. This is then placed between two



TYPICAL TRANSPARENCIES MADE IN THE AUTHOR'S CLASSES.




DETAILS OF HACK SAW.

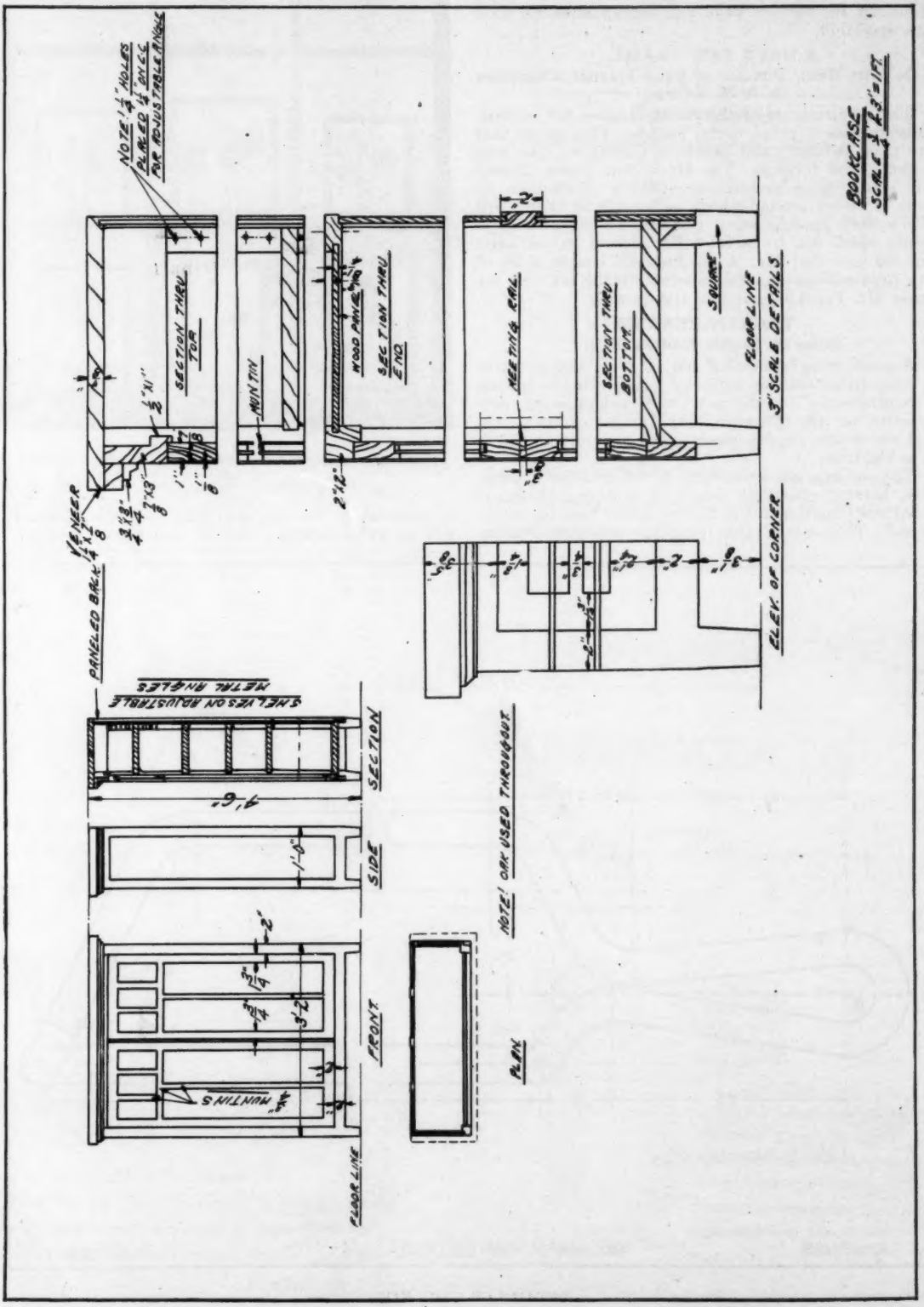
pieces of rice or transparent paper and these are pasted together just around the edges.

Cut two frames, one for the front and the other for the back but proportioned so that the laws of spacing are well observed. Paste one side of each of the frames, and place over the transparent paper.

## BOOKCASE.

**F. W. Ziegenhagen, Instructor in Woodwork, Boys' Technical High School, Milwaukee, Wis.**

The bookcase illustrated is an advanced problem in cabinet making and should not be attempted by students in their first year of woodwork.




BOOK CASE.

All the necessary details of construction are shown, so only a few suggestions will be offered. The front legs may be solid oak or veneered stock, whereas the rear legs are of single thickness, being reinforced below the bottom rail to make the appearance uniform.

The sides and back of the bookcase are paneled. However, solid stock may be substituted where three-ply panel is not available. The two sides should be glued together after the stock has been planed, scraped and sandpapered. The holes, as shown in the side section, are drilled for the metal angles and must not be forgotten.

It will be noticed in the top section that veneer is called for around the edges of the top. This may be eliminated by using plain white oak strips which show a quarter-sawed effect.

Care must be taken in machining the stock for the doors. I would suggest cutting all the mortises and tenons before cutting the rabbet for the glass.

The case may be made either in plain, or quartered oak. It may also be made of birch and stained a mahogany shade.

## ART COURSES IN LOS ANGELES.

The high schools of Los Angeles, Cal., are offering special work along the lines of trade art and business art. The former trains the student in poster design and show card writing and covers three hours' work each day. The latter offers training in observation, psychology of advertising, attractive advertising, and reasons for attractiveness. Instruction is also given in business letter writing, office arrangement and business apparel.

In the department of trade art, the schools offer courses in costume design and newspaper drawing, advertising art and cartooning, interior decoration, furniture design, and stage scenery and costumes.

The department of business art offers courses in printing, dress design and pattern making, pattern drafting, sheet metal work, power machine work.

The courses are arranged as follows:

*Poster Design and Show Card Writing*—The student learns to make an appropriate poster, the uses of the different mediums in the making; theatrical, commercial, art glass windows, book cover poster, and flat color harmony suitable for all posters, and poster design.

*Costume Design and Newspaper Drawing*—This is a practical course for students who will do newspaper work in the dry goods establishments. The garments are drawn in pen and ink for reproduction purposes and a study of textures is undertaken.

*Advertising Art and Cartooning*—The course follows the psychology of advertising and is done in pen or brush, suitable for newspapers. The cartooning course covers national cartoons in which there is more or less study of wash drawing and exaggerated forms, and interpretation of various forms.

*Interior Decoration*—A four-year course, beginning with the study of color harmonies, the manipulation of the different mediums in paints, the study of kalsomines, oil and water colors, and varnishes, furniture design, wall paper design and period types, and the working out of interiors and sketches and a practical demonstration of problems in community work.

*Furniture Design*—This may be taken as a part of interior decoration or in conjunction with it. It includes a study of period and modern furniture and is designed to meet the demand for furniture designers thruout the country. The problems include work in furniture proportions, worked out in flat color and especially designed furniture drawn to scale, with working drawings.

*Stage Scenery Properties and Costumes*—A four-year course which has for problems the making of scenery to scale for various models and the working out of the models on the stage. It includes a study of stage perspective, lighting and color harmony. In addition, the pupils make a study of costumes and the working out of them in color harmony in connection with the scenery designed.

*Printing*—The student is taught the position of the letters in the boxes of the case. Instruction is given in setting a paragraph, in cleaning out and in feeding at slow speed. Advanced students set "live" work, feed register jobs on presses and make ready jobs on the press for beginners to feed, figure and cut stock. Principles of type and harmony, artistic display, color printing, embossing, cost estimating, layout and imposition are studied.

*Dress Design and Pattern Making*—The course correlates with vocational dressmaking and is intended to develop designers for the trade. The course covers figure drawing, original model designing, developing designs in color, pattern drafting and the making of models in material from the drafted pattern.

*Sheet Metal Work*—Opportunity is given for correlating home interest with the school work and for putting into practical use the knowledge of mechanics, mathematics and drawing. The work trains the student in concentration and develops facility in the handling of a variety of light machines and hand tools. Instruction is given in laying out patterns, in the operations of cutting, forming, seaming, riveting, soldering, also in the hammering, shaping and brazing processes employed in art metal work.

*Power Machine Work*—Practice is given on various types of machines, covering the operations of stitching, punching, seaming, making of overalls, store aprons, butcher frocks, fancy goods, covers and scarfs.

*Trade Art*—Instruction is given in trade drawing and poster work, interior design, commercial illustrating, show card display and lettering, business signs, stage scenery.

## NEW BOOKS.

### Applied Science for Metal Workers.

By William H. Dooley. Cloth, 479 pages. Price, $2. The Ronald Press Co., New York.

This book follows exactly the lines of the author's earlier book, Applied Science for Wood Workers, and presents a systematic study of the elements of science as applied to modern industry. In addition to the fundamentals of physics, chemistry, mechanics and electricity special chapters are devoted to common tools and industrial processes, iron and ironmolding, pattern making, the making and working of wrought iron, of steel, structural steel, machine shop practice, sheet metals, etc.

The book is a splendid example of the new type of textbook which is being developed for vocational schools. It is clear and concise in style and simple in its presentation of difficult principles. It is truly an "applied" science in that every important principle is illustrated with facts and pictures taken from typical industrial practice of today.

## PUBLICATIONS.

*Vocational Education Survey.* Survey number of the Elmira, N. Y., School Bulletin. Edited by A. J. Jacoby, Supt. The survey was conducted under the direction of a committee of ten, with Mr. C. J. Merchant in charge, and had for its main purpose the determination of the vocational needs of the city and the adoption of a plan to meet these needs intelligently and wisely. The report on the survey takes up such trades as metal work, garment making, printing, wood working, electricity, building, commercial work and domestic service and those allied lines such as vocational work and cooperative agencies.

*Three Hundred Practical Shop Kinks.* Revised edition. The American Machinist, New York. This little booklet of 46 pages contains over three hundred ideas picked from the American Machinist, each of which is a helpful suggestion for the shop or draughting room. It takes up grinding, gear cutting, steel treating, drafting, lathe work, care of bearings, drilling, planing and milling, and includes a number of shop recipes.

*The Fabric of Civilization.* A short survey of the cotton industry in the United States. Issued by the Guaranty Trust Co., New York City. The survey does not pretend to cover the field in all its diversity. It aims to give, in brief compass, such general facts concerning the industry in the United States as will enable the reader to quickly familiarize himself with its broader outlines. Among subjects discussed are the source of cotton, the cotton market, finance, the cotton mill, and American cloth in foreign markets.

*Flour Milling.* Prepared by J. A. LeClerc, chemist in the laboratory of plant chemistry, Bureau of Chemistry, U. S. Department of Agriculture. Vocational Rehabilitation Series No. 42, Aug., 1919. Issued by the Federal Board of Vocational Education, Washington. The pamphlet has been prepared for the purpose of assisting the returned soldier in finding himself in the line of civilian work. It takes up the various branches of the milling business, discussing the relation of disabilites to the work, and the means of obtaining training. The descriptions are taken from the "descriptions of occupations" in flour milling, published by the Department of Labor.

# NOW, ARE THERE ANY QUESTIONS?

*This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.*

### Mahogany Finish for Victrola.

11. Q:—Could you advise me how to get a hand rubbed, dark red mahogany finish on a birch victrola I have completed?—*S. J. L.*

A:—First sponge the birch victrola case with clear, warm water to raise the grain, and after drying carefully, sand thoroly.

Following this treatment, stain with a water solution of two ounces potassium bicromate, two ounces of mahogany brown, one-half ounce of mahogany red (both water soluble colors) per gallon of hot water. In case the stain does not penetrate readily, add one ounce of acetic acid to the gallon of stain. Allow it to dry at least twelve hours and give a sizing coat of orange shellac which has been tinted with alcohol soluble Bismark Brown, to a red shade.

After drying, fill with a very thin silex filler tinted with burnt sienna and VanDyke Brown, with a touch of Rose Lake. Clean off carefully and allow it to harden 48 hours. Sand clean but lightly with 00 paper. Dust off and give a well brushed out coat of Pratt & Lambert's 61 or Keystone Degrah. Allow it to dry in a warm room for three days, sand carefully with a split 0000 paper, clean off and revarnish, repeating for three coats. The third and fourth coats should be rubbed well with a felt pad, FF pumice stone and water, and in case a polished finish is desired, the last rubbing should rest 24 hours, and then be polished with felt pad, rotten stone and water, using a soft pad for the purpose. Wash off freely and clean up with a good oil polish. Best results for polishing are secured by applying the polish on a cloth wrung out of water and the cleaning up with a soft, dry goods, preferably old silk.—*R. G. Waring.*

### Ivory Finish for Dressing Table.

14. Q:—Please inform me of the method and materials to use in obtaining an ivory finish on a dressing table. The finish desired seems to be a white enamel base with a brown substance added toning the entire a rich cream with a deeper tone in corners.

Where can I have a dressing bench top caned? We have tried several jobbers but without success.—*J. A. R.*

Answering the inquiry regarding the enameling of furniture I am offering the following suggestions: Buy Pratt & Lambert's Vitralite enamel and tint with French ochre or medium chrome yellow in *japan*. Artist tube colors will prove to be the most economical. Add a very little color to the enamel, work up well with a brush and then stir in thoroly, repeating until the correct shade is reached. Keep in the light shades of ivory rather than the strong creams which soon prove tiresome. If the tone appears too bright, shade with a very light burnt umber and English vermilion, a mere touch of the latter is sufficient.

For the undercoat use Pratt & Lambert undercoater and shade to approximately match the enamel. Good enamels run very high in cost just now, but since they last a very great time are well worth their first cost. Cheap enamels are worthless at any price.

Sand all work clean, dust off and give a coat of Pratt & Lambert 61 varnish to act as a size coat. Avoid all shellac. When dry sand smooth, and coat with Pratt & Lambert Undercoater. Apply at least three coats, all to be sanded smooth with 00 paper.

Use a clean 2" badger brush for the Vitralite and avoid using a new brush if possible. Do not work the enamel more than necessary; lay on smooth and let it alone, working from the raw to the finished work. Above all else work in a clean, warm room which will stay about 78°. Let the work dry at least three days, then sand smooth and free from nibs. Clean off with a "tacky" cloth and give a second coat of enamel. Repeat until a satisfactory surface is secured. The last two coats must be carefully rubbed out with felt pad, F pumice stone and water. Never rub in oil. In case you wish to shade your panel lines, use part of your enamel to make a harmonizing darker shade of a brown tone and reduce with turpentine to form a very thin glaze; spray on with a good atomizer or use a fine haired water color brush and wipe off all decorations so as to high light where needed, leaving a darker glaze only at the base of the decoration. Read the article on enamels in this issue before doing your glazing.

See the advertisements in this paper for cane work.—*Ralph G. Waring.*

### Finishing Inlayed Furniture.

17. Q:—We are making some pieces of furniture of mahogany and walnut which we intend to inlay. The mahogany will be inlaid with white maple lines, and the walnut with cherry. What methods would you suggest for darkening the grounds with good taste without destroying the beauty of the grain? Would you recommend shellacing the inlay and using a water stain?—*W. W. F.*

A:—The questioner's idea of running a pencil strip of white shellac on the inlay is quite correct but must be carefully done to avoid side laps. A better way consists in soaking all inlay strips in white shellac before inlaying in which case the stain will not penetrate.

The walnut or mahogany may be coated with lime water to produce a very good color. Purchase a tube of calcium oxide at the drug store and dissolve in the designated amount of water. This oxide is a soluble form put up to permit quick preparation of lime water for children. In case it cannot be secured, get lump quick lime, slack carefully with hot water and then cover with water, after which stir and let settle. Decant the clear liquid for use, apply freely and let dry over night. Then give a coat of linseed oil and turpentine, half and half, with a teaspoonful of drier per pine mixture. I would suggest that you try this on a sample panel. If not sufficiently bright in color it will be necessary to make up a water stain. It will be an advantage to sand all inlay lines with 00 paper *after* shellacing over the oil coat and after filling with a dark brown filler. Be sure that all inlay lines are bright and clean, otherwise subsequent varnish coats will magnify the discoloring of your inlay.—*Ralph G. Waring.*

## BOOKS AND PAMPHLETS.

*Better Furnishings for Better Homes.* By Dr. James P. Haney. An address delivered at the first convention of the National Association of Decorative Arts and Industries, May, 1919. This small pamphlet of seven pages takes up the problem of raising the standard of taste and manufacture in home furnishings. It discusses the place of the home maker in her home, the rising standards of production, style madness, better advertising, the opportunity of the trade to cater to the home, opportunities to be found in the public schools for rendering service, and urges the support of the association in its work.

*Drawing and Industrial Art Courses for the Public Schools of Duluth, Minn.*, for the year 1919. This pamphlet is one of a series of five which has been issued in printed form for the use of the schools. The pamphlets were prepared under the direction of a committee of teachers and include provisions for the content, aim and purpose of work for all grades, an outline of the subject matter, general directions, a detailed outline of procedure, and a general bibliography. The courses are intended as a standard of achievement for the present and as a guide post for future progress. Among the subjects covered are design and craft work, pottery, weaving, elementary knitting, leather work, basketry, costume design, figure drawing, art metal work, and art appreciation.

*Use and Preparation of Food.* Prepared under the direction of C. A. Prosser. Bulletin No. 35, Federal Board for Vocational Education, Washington. The American housekeeper of today is faced with the problems of assisting in the maintenance of the world food supply, of feeding the family properly to maintain health and efficiency, and of choosing food so that the family income may be wisely used. The present pamphlet is intended to be of help to the home makers of the country and to the girls and women who are to be home makers in the solution of these problems. It may also be used as a basis of instruction in day, part-time and evening classes in home economics.